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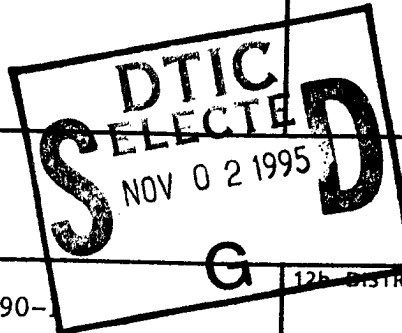
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## Abstract

Observing God: Thomas Dick (1774-1857), Evangelicalism and Popular Science in Victorian Britain and Antebellum America

William Joseph Astore, Captain, USAF

Doctor of Philosophy, 1995  
Modern History Faculty  
University of Oxford  
370 Pages

This thesis focuses on Thomas Dick's (1774-1857) life and works. A Scottish theologian, educationalist, astronomer and popularizer of science, Dick disseminated a Christianized form of science to inhibit secularization, to win converts to Christianity, and to persuade evangelicals that science was sacred. His devotional theology of nature made radical claims for authority amid the cultures of Victorian Britain and antebellum America.

After an extended biographical sketch, Dick's doxological theology of nature is set within the context of natural theology in nineteenth-century Britain, and his views on the plurality of worlds, the nebular hypothesis, and geology are detailed. Dick's works had a strong aesthetic component, and through them he sought to reform the behaviour of all social classes to advance the millennium. The complexity of scientific popularization is highlighted by examining Dick's works. The publishing history of these works, their availability in libraries and other public spaces, and their reception in particular contexts (among Calvinistic Methodists in Wales, and among workers who pursued astronomy), are also analyzed.

Two chapters are devoted to Dick's enormous influence in antebellum America, where his pacifism and abolitionism won him supporters in Northern evangelical culture. He dominated the burgeoning field of popular astronomy in America from 1830 until c.1870. Considerable disagreements as to astronomy's cultural meaning and uses are shown to have existed. It is further shown that evangelicals used astronomy to teach moral and religious lessons, and that women in America had more prominent roles to play in astronomy than have previously been recognized.

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## Bibliography of Key Primary and Secondary Sources

### Key Primary Sources

Dick, Thomas. 'On Literary and Philosophical Societies', *Monthly Magazine*, 37 (Apr. and July 1814), 219-21, 507-10; 38 (Aug. and Sept. 1814/Jan. 1815), 23-5, 121-22, 503-06.

\_\_\_\_\_. *The Christian Philosopher; or, the Connection of Science and Philosophy with Religion*. Tenth edition. Glasgow: William Collins, [1823], 1846.

\_\_\_\_\_. *The Philosophy of Religion; or, an Illustration of the Moral Laws of the Universe*. Brookfield, Mass.: E. and G. Merriam, [1826], 1829.

\_\_\_\_\_. *The Philosophy of a Future State*. Glasgow: William Collins, 1828.

\_\_\_\_\_. *On the Improvement of Society by the Diffusion of Knowledge: or, an illustration of the advantages which would result from a more general dissemination of rational and scientific information among all ranks*. Edinburgh: Waugh and Innes, 1833.

\_\_\_\_\_. 'The Advantages of the Study of Astronomy', in Elijah Hinsdale Burritt, *The Geography of the Heavens, and Class-Book of Astronomy*. Accompanied by a Celestial Atlas. New York, [1833], 1855, pp. viii-xxiv.

\_\_\_\_\_. *Christian Beneficence contrasted with Covetousness, illustrating the means by which the world may be regenerated*. London, 1836.

\_\_\_\_\_. *On the Mental Illumination and Moral Improvement of Mankind; or, an inquiry into the means by which a general diffusion of knowledge and moral principle may be promoted*. New York: Robinson, Pratt & Co., 1836.

\_\_\_\_\_. *Celestial Scenery; or, the Wonders of the Planetary System Displayed: Illustrating the Perfections of Deity and a Plurality of Worlds*. Philadelphia: E.C. & J. Biddle, [1837], 1845.

\_\_\_\_\_. *The Sidereal Heavens, and other subjects connected with Astronomy, as illustrative of the character of the Deity and of an infinity of worlds*. Philadelphia: E.C. & J. Biddle, [1840], 1845.

\_\_\_\_\_. *The Practical Astronomer, comprising illustrations of light and colours - practical descriptions of all kinds of telescopes - the use of the equatorial transit - circular, and other astronomical instruments, a particular account of the Earl of Rosse's large telescopes, and other topics connected with astronomy*. London: Seeley, Burnside and Seeley, 1845.

\_\_\_\_\_. *The Solar System, with moral and religious reflections in reference to the wonders therein displayed*. London: Religious Tract Society, 1846.



### Key Secondary Sources

- Altick, Richard D. *The English Common Reader: A Social History of the Mass Reading Public 1800-1900*. Chicago: University of Chicago Press, 1957.
- Baxter, Paul. *Science and Belief in Scotland, 1805-1868: The Scottish Evangelicals*. Ph.D. Thesis, Edinburgh University, 1985.
- Bradley, Ian. *The Call to Seriousness: The Evangelical Impact on the Victorians*. London: Jonathan Cape, 1976.
- Brashear, John A. 'A Visit to the Home of Dr. Thomas Dick: The Christian Philosopher and Astronomer', *Journal of the Royal Astronomical Society of Canada*, 7 (1913), 19-30.
- Brooke, John Hedley. 'Natural Theology in Britain from Boyle to Paley', in Brooke and R. Hooykaas, *New Interactions between Theology and Natural Science*. Milton Keynes: Open University Press, 1974, pp. 5-54.
- Brooke, John Hedley. 'Natural Theology and the Plurality of Worlds: Observations on the Brewster-Whewell Debate', *Annals of Science*, 34 (1977), 221-86.
- Brooke, John Hedley. 'Science and the Fortunes of Natural Theology: Some Historical Perspectives', *Zygon*, 24 (1989), 3-22.
- Cannon, Susan Faye. *Science in Culture: The Early Victorian Period*. New York: Science History Publications, 1978.
- Cooter, Roger. *The Cultural Meaning of Popular Science: Phrenology and the Organization of Consent in Nineteenth Century Britain*. Cambridge: Cambridge University Press, 1984.
- Crowe, Michael. *The Extraterrestrial Life Debate 1750-1900: The Idea of a Plurality of Worlds from Kant to Lowell*. Cambridge: Cambridge University Press, 1986.
- Gavine, David. 'Thomas Dick, L.L.D., 1774-1857', *Journal of the British Astronomical Association*, 84 (1974), 345-50.
- Gavine, David. 'Thomas Dick (1774-1857) and the Plurality of Worlds', *Journal of the Astronomical Society of Edinburgh*, 28 (1992), 4-10.
- Heyck, Thomas W. *The Transformation of Intellectual Life in Victorian England*. London: Croom Helm, 1982.
- Jones, Edward T. *The Theology of Thomas Dick and its Possible Relationship to that of Joseph Smith*. M.A. Thesis, Brigham Young University, 1969.
- Lindberg, David C. and Ronald L. Numbers, eds. *God & Nature: Historical Essays on the Encounter between Christianity and Science*. Berkeley: University of California Press, 1986.
- Macpherson, Hector. 'Thomas Dick: "The Christian Philosopher"', *Records of the Scottish Church History Society*, 11 (1955), 41-62.

Moore, James R. 'Speaking of "Science and Religion"--Then and Now', *History of Science*, 30 (1992), 311-23.

Morrell, Jack B. 'Professors Robison and Playfair, and the *Theophobia Gallica*: Natural Philosophy, Religion and Politics in Edinburgh, 1789-1815', *Notes and Records of the Royal Society*, 26 (1971), 43-63.

Secord, James A. 'Newton in the Nursery: Tom Telescope and the Philosophy of Tops and Balls, 1761-1838', *History of Science*, 23 (1985), 127-51.

Shapin, Steven. 'History of Science and its Sociological Reconstructions', *History of Science*, 20 (1982), 157-211.

Smith, James V. 'Manners, Morals and Mentalities: Reflections on the Popular Enlightenment of Early Nineteenth Century Scotland', in Walter M. Humes and Hamish M. Paterson, eds., *Scottish Culture and Scottish Education 1800-1980*. Edinburgh: John Donald Publishers, 1983, pp. 25-54.

Smith, James V. 'Reason, Revelation, and Reform: Thomas Dick of Methven and the "Improvement of Society by the Diffusion of Knowledge"', *History of Education*, 12 (1983), 255-70.

Topham, Jonathan. "An Infinite Variety of Arguments": *The Bridgewater Treatises and British Natural Theology in the 1830s*. Ph.D. Thesis, Lancaster University, 1993.

Turner, Frank M. *Contesting Cultural Authority: Essays in Victorian Intellectual Life*. Cambridge: Cambridge University Press, 1993.

Yeo, Richard R. *Defining Science: William Whewell, Natural Knowledge, and Public Debate in Early Victorian Britain*. Cambridge: Cambridge University Press, 1993.

Young, Robert M. *Darwin's Metaphor: Nature's Place in Victorian Culture*. Cambridge: Cambridge University Press, 1985.

Observing God: Thomas Dick (1774-1857), Evangelicalism and Popular Science  
in Victorian Britain and Antebellum America

William Joseph Astore, M.A.

Thesis submitted to the Faculty of Modern History, University of Oxford,  
for the Degree of Doctor of Philosophy

History of Science  
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#### A Note to the Reader

Following standard procedures for footnoting at the University of Oxford, forenames of authors have been abbreviated. The reader is requested to refer to the bibliography, where whenever possible these forenames have been given in full, together with complete publication data.

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## List of Abbreviations

AAS	American Antiquarian Society
ASSU	American Sunday School Union
BJHS	British Journal for the History of Science
DAB	Dictionary of American Biography
DCA	City of Dundee Archives
DNB	Dictionary of National Biography
DWB	Dictionary of Welsh Biography
NLS	National Library of Scotland
NLW	National Library of Wales
RAS	Royal Astronomical Society
RTS	Religious Tract Society
SDUK	Society for the Diffusion of Useful Knowledge
c.	column (newspaper)
fn.	footnote
n.p.	no page

## Chapter 1: Introduction

Within the last 22 years, he has published about 10 volumes on literary, scientific, and theological subjects, calculated to promote the intellectual and moral improvement of society, particularly of the middle and lower ranks of the community. The general aim of these volumes has been to bring the more useful and interesting portions of science within the comprehension of general readers, and to render the discoveries of science, and the improvements of the useful arts subservient to the promotion of the interests of religion and Christian morality.<sup>1</sup>

The above bare outline of Thomas Dick's works and their purpose was written by Dick himself when he applied for a government pension in 1846. My aim is to flesh out this outline, to provide a thoroughly variegated and contextualized account of the life, works and rich legacy of this 'Christian philosopher', a sobriquet he earned from his first and most successful book, *The Christian Philosopher, or, the Connection of Science and Philosophy with Religion*. Published in 1823, this passed through more than twenty editions during the next forty years. That he is not, however, as well known today as his two closest Scottish evangelical contemporaries--Reverend Thomas Chalmers and Sir David Brewster--is at least partially attributable to the difficulty of defining his impact. Dick was neither a theologian of Chalmers's influence nor was he a natural philosopher of Brewster's stature.

Yet, in a number of important ways, Dick embodied the co-existing cultures of his day. He straddled two centuries, spending the first twenty-six years of his life in the eighteenth, the remaining fifty-seven in the nineteenth--and thus was influenced both by Enlightenment rationality and by the devout religious seriousness of evangelicalism. A close look at his life is valuable precisely because he earnestly grappled with so many of the issues of his day. He was especially successful in reconciling to his own satisfaction, and, more crucially, to the satisfaction of many of his readers,

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<sup>1</sup>'Statement in Relation to T.D.', 1846, DCA GD/x33/2/3.



values and convictions associated with science and those associated with a serious and deeply felt Christian faith.

Within the last thirty years, historians have increasingly turned to investigate popular culture and the cultural diffusion of science.<sup>2</sup> It is within this context that Dick's influence was most noteworthy. As a schoolmaster, lecturer, proponent of mechanics' institutes and director of Dundee's Watt Institute from 1830-31, and, most importantly, as the author of nine books on theology, science, and education and three tracts on science for the Religious Tract Society, Dick constantly sought to disseminate knowledge of science. His books and tracts proved particularly popular in the United States, where he was awarded an honorary doctorate of laws by Union College in New York in 1832, and where complete editions of his works continued to be printed until 1884.<sup>3</sup> Indeed, the breadth of the appeal of his works--to a range of readers stretching from prominent abolitionists and major literary figures in America to missionaries in Africa, from Mormons and Calvinistic Welsh Methodists to leading astronomers in Britain, America and Canada--was in itself astonishing.

### 1.1 Biography and Thomas Dick

To understand fully the culture of Regency and Victorian Britain and antebellum America, eclectic evangelical 'Christian philosophers' like Dick need to be studied seriously. Possessing multifarious interests and attributed wide-ranging influence, Dick has understandably been studied from

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<sup>2</sup>A useful compendium of such studies is M. Schudson and C. Mukerji, eds. *Rethinking Popular Culture: Contemporary Perspectives in Cultural Studies* (Berkeley, 1991), esp. pp. 1-61, 'Introduction: Rethinking Popular Culture'.

<sup>3</sup>*National Union Catalog pre-1956 Imprints*, v. 142 (London, 1971), 551-60.

several, limited, perspectives: as the evangelical theologian,<sup>4</sup> the educational reformer,<sup>5</sup> the amateur astronomer,<sup>6</sup> and the fervid exponent of a plurality of worlds.<sup>7</sup> This thesis interrelates and integrates these perspectives to produce a narrative of the life of Thomas Dick which best approximates how he saw himself, and how his contemporaries saw him. Biography remains a valid and productive historical form for historians of science,<sup>8</sup> a point which several recent biographies serve to confirm.<sup>9</sup> This thesis provides what has hitherto been lacking in narrower biographical studies: an integrated and extended treatment of Dick's life and legacy which encompasses the widest possible array of cultural concerns, to include issues of ideology, politics, and gender.

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<sup>4</sup>H. Macpherson, 'Thomas Dick: "The Christian Philosopher"', *Records of the Scottish Church History Society*, 11 (1955), 41-62.

<sup>5</sup>J.V. Smith, 'Reason, Revelation, and Reform: Thomas Dick of Methven and the "Improvement of Society by the Diffusion of Knowledge"', *History of Education*, 12 (1983), 255-70; idem, 'Manners, Morals and Mentalities: Reflections on the Popular Enlightenment of Early Nineteenth Century Scotland', in W.M. Humes and H.M. Paterson, eds., *Scottish Culture and Scottish Education 1800-1980* (Edinburgh, 1983), pp. 25-54.

<sup>6</sup>D. Gavine, 'Thomas Dick, L.L.D., 1774-1857', *Journal of the British Astronomical Association*, 84 (1974), 345-50; idem, 'Thomas Dick (1774-1857) and the Plurality of Worlds', *Journal of the Astronomical Society of Edinburgh*, 28 (1992), 4-10.

<sup>7</sup>M.J. Crowe, *The Extraterrestrial Life Debate 1750-1900: The Idea of a Plurality of Worlds from Kant to Lowell* (Cambridge, 1986), pp. 241-46, 596-98.

<sup>8</sup>T.L. Hankins, 'In Defence of Biography: The Use of Biography in the History of Science', *History of Science*, 17 (1979), 1-16; S. Sheets-Pyenson, 'New Directions for Scientific Biography: The Case of Sir William Dawson', *History of Science*, 28 (1990), 399-410. For some cautions about biography as an historical form see D. Outram, 'Scientific Biography and the Case of Georges Cuvier: With a Critical Bibliography', *History of Science*, 14 (1976), 101-37, esp. 110-14; and S. Shapin, 'Essay Review: Personal Development and Intellectual Biography: The Case of Robert Boyle', *BJHS*, 26 (1993), 335-45, esp. 337-40 and 344-45.

<sup>9</sup>A. Desmond and J. Moore, *Darwin* (London, 1991); G. Cantor, *Michael Faraday: Sandemanian and Scientist. A Study of Science and Religion in the Nineteenth Century* (London, 1991); C. Carson and S.S. Schweber, 'Recent Biographical Studies in the Physical Sciences', *Isis*, 85 (1994), 284-92.

Focusing on Dick's intellectual development and his way of looking at the world, I argue that he sought and, in the words of one Victorian admirer, 'nobly earned the dignified title attached to one of his excellent volumes,--*The Christian Philosopher*'.<sup>10</sup> I show that this term had a definite meaning in the early 1800s, indicative of near saintly devotion to God and to His two holy books of Nature and Scripture. Capable of being read within a devotional context, Dick's writings, largely relating science to evangelical Christianity, fulfilled an important desideratum for forms of knowledge, combining popular science with a theology of nature, which were consistent with and further advanced both the evangelical movement in early Victorian Britain and the Second Great Awakening in antebellum America.

## 1.2 Definition of Terms and Historiographical Considerations

Describing Dick as an evangelical who sought to disseminate a popular and thoroughly Christianized form of science raises immediate problems of definition. To define these three terms, one must set them within an appropriate historiographical context, recognizing that their meanings were to varying degrees still being formulated in the early 1800s. Here they will be considered in turn.

As many historians have noted, the influence of evangelicalism in eighteenth- and nineteenth-century Britain extended far beyond evangelical circles.<sup>11</sup> For É. Halévy evangelicalism 'was the moral cement of English

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<sup>10</sup> S.A. Allibone, *A Critical Dictionary of English Literature*. 3 vols. (Philadelphia, 1877), I, 499.

<sup>11</sup> The best introduction is provided by D.W. Bebbington, *Evangelicalism in Modern Britain: A History from the 1730s to the 1980s* (London, 1989).

society'; for D.C. Somervell it 'moulded the character of the nation'.<sup>12</sup> Though challenged for cultural and intellectual dominance by Benthamism, Tractarianism, and other, less pervasive ideological movements, its influence in late Georgian, Regency and Victorian Britain was incalculable and profound.

As an ideology, evangelicalism emphasized salvation by faith through grace earned by the atoning death of Christ;<sup>13</sup> sudden and intensely personal conversions, with an individual's conscience being filled with and overcome by grace; the authority of Scripture; the absolute sovereignty of God and the all-pervasive presence of Providence in life; the reality of an afterlife or 'future state'; the importance of charismatic preaching and simple forms of worship as opposed to ritual and mystery; and support for spreading the gospel, in particular through foreign missions. It stressed intimate and intensely emotional relationships with the living Christ, Who spoke directly to the hearts and souls of His chosen. Ultimately, as Boyd Hilton has noted, it was an individualistic religion which stressed the spiritual struggle between good and evil within each mortal soul.<sup>14</sup> Since one's conduct in public was thought to provide evidence of whether one was saved or damned, evangelicals were often conspicuous by their fervid piety, crusading zeal, and support for philanthropic schemes. As one devout American wrote in his private journal, 'No one can possess religion and not manifest it in his life

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<sup>12</sup>É. Halévy, *The Triumph of Reform 1830-1841*, rev. ed. (London, 1950, 1961), p. 163; D.C. Somervell, *English Thought in the Nineteenth Century* (New York, 1929, 1965), p. 101; G.M. Young, *Victorian England: Portrait of An Age*, 2nd ed. (London, 1953), esp. pp. 1-5, 12. I have also found useful J. Clive's *Not by Fact Alone: Essays on the Writing and Reading of History* (New York, 1989).

<sup>13</sup>Dick took the line that salvation without grace was impossible: *Philosophy of Religion*, p. 292.

<sup>14</sup>B. Hilton, *The Age of Atonement: The Influence of Evangelicalism on Social and Economic Thought, 1795-1865* (Oxford, 1988), esp. pp. 8-12. See also I. Bradley, *The Call to Seriousness: The Evangelical Impact on the Victorians* (London, 1976).

and conversation'.<sup>15</sup> At this time, evangelicals did not slavishly adhere to Calvin's *Institutes* or take a defiant stance on predestination.<sup>16</sup> And, though they might differ on exactly how and when the millennium would come, they never doubted its inevitability.

When capitalized, 'Evangelical' in the early nineteenth century referred to one of the two major parties within the Established Church of Scotland, the other being the Moderate. In this restricted sense, Dick was not an Evangelical, since he was an Antiburgher Seceder. That is, Dick was to be counted among those Scottish evangelicals who had left the Established Church because they found it lacking in spiritual discipline and rigour.<sup>17</sup> Yet, in a more inclusive sense, 'evangelical' could refer to those who shared a religious outlook informed by particular beliefs and concerns. This could include the Evangelical party within the Church of England and evangelical nonconformists like Methodists, Baptists and Congregationalists. These different denominations lent support to this more inclusive usage by cooperating in organizations like the Religious Tract Society (1799), the Sunday School Union (1803), and the British and Foreign Bible Society (1804). Throughout this thesis, I shall use 'evangelical' in this inclusive sense, and restrict 'Evangelical' for that party so named within Scotland's Established

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<sup>15</sup> Journal of Thurston Brown, 11 Jan. 1843, MSS Brown, AAS.

<sup>16</sup> C.G. Brown, *The Social History of Religion in Scotland since 1730* (London, 1987), pp. 140-41; B. Hilton, *Age of Atonement*, pp. 8-9.

<sup>17</sup> Seceders originally split from the Established Church in 1733. They then split into Burgher and Antiburgher sections in 1747, with Antiburghers refusing to submit to the Burgess Oath, which they believed implied recognition of the Established Church. Between 1799 and 1806, the Burghers and Antiburghers split into two more sections, 'Auld Lichts' and 'New Lichts', with the latter (ascribed to by Dick) emphasizing Christ's offer of salvation while easing Calvinist doctrine. The two 'New Licht' factions combined in 1820 to form the United Secession Church, and in 1847 joined with the Relief Church to form the United Presbyterian Church. See *Ibid.* [Brown], pp. 34-6, 108-09. Also see J. M'Kerrow, *History of the Secession Church* (Glasgow, 1841); and R. Small, *History of the Congregations of the United Presbyterian Church from 1733 to 1900*. 2 vols. (Edinburgh, 1904).

Church.

Raising equally complex issues of definition is the second word I have used to describe Dick and his writings.<sup>18</sup> In the late twentieth century, 'popular' science has acquired a pejorative sense, in that the popularizer is considered by some to provide a form of science which is pabulum at best, poison at worst.<sup>19</sup> Throughout most of the nineteenth century, things were different. Accepting for the moment that one could then distinguish 'élite' from 'popular' science (with 'élite' defined here as highly specialized knowledge, such as Laplace's writings on celestial mechanics, which was not easily grasped by unsophisticated audiences), the latter was rarely seen as an amateurish, imprecise, or otherwise degraded variety of the former. As Steven Shapin has noted, even in formal, scientific societies like that of the Royal Society of Edinburgh,

Well into the nineteenth century the audience for general science ... remained a non-specialist audience. The common bond was interest in natural knowledge; expert performer and non-expert audience were drawn into a social circle by an appreciation of the various values of this form of cultural activity. The inclusive character of the Society was not lamented by its scientific leaders.<sup>20</sup>

One should take care, then, in drawing a line between 'élite' and 'popular' science. Because there existed shared practices or values between the two, the élite-popular dichotomy can be too rigid. To cite only one

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<sup>18</sup> On the shifting meanings of 'popular' see M. Shiach, *Discourse on Popular Culture: Class, Gender and History in Cultural Analysis, 1730 to the Present* (Oxford, 1989), ch. 1.

<sup>19</sup> On this and related issues of popularization see J.C. Burnham, *How Superstition Won and Science Lost: Popularizing Science and Health in the United States* (New Brunswick, 1987); S. Hilgartner, 'The Dominant View of Popularization: Conceptual Problems, Political Uses', *Social Studies of Science*, 20 (1990), 519-39; R. Cooter and S. Pumfrey, 'Separate Spheres and Public Places: Reflections on the History of Science Popularization and Science in Popular Culture', *History of Science*, 32 (1994), 237-67; T. Shinn and R. Whitley, eds., *Expository Science: Forms and Functions of Popularization* (Dordrecht, 1985).

<sup>20</sup> S. Shapin, 'The Audience for Science in Eighteenth century Edinburgh', *History of Science*, 12 (1974), 95-121: 100.

example, in almanacs one can see 'popular' discussions on whether moonbeams had the power to distort human countenances co-existing comfortably with 'élite' extracts from John Herschel's *Discourse on Natural Philosophy*.<sup>21</sup> During Dick's lifetime, natural philosophy was still considered more or less accessible to all,<sup>22</sup> and many of its promoters endeavoured to keep it that way. A more sensitive way to use the word 'popular' is in the sense of what audience was being targeted. Throughout this thesis, I consider texts, lectures, and other forms of knowledge to be 'popular' if they were intended to promote knowledge of science beyond the cultural élite of scientists then being constructed.

Here one might briefly distinguish between the acceptable face of 'popular' science and its more 'sensationalist' versions. The former represented forms of knowledge, made accessible to an educated lay audience, which the great majority of scientists adjudged respectable, usually by their apparent conformity to Baconian inductivism. The latter, in contrast, were contentious forms of knowledge, such as astrology, mesmerism and phrenology, which a majority of scientists rejected or found highly conjectural, again as measured (ostensibly) by Baconianism. Though not mutually exclusive, and fraught with sociological complexities, 'popular' and 'sensationalist' categories of science were effectively demarcated in Dick's writings. Dick wrote extensively on the former, but, except for a few statements condemning astrology, wrote nothing about the latter.

Another highly sensitive term is 'popularization', which represents much more than a straightforward diffusion of simplified forms of specialized

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<sup>21</sup>C.F. Egelmann, *The Citizens' and Farmers' Almanac, for the Year of our Lord 1832* (Baltimore, 1831), n.p.

<sup>22</sup>S.G. Kohlstedt makes this point in her 'Parlors, Primers, and Public Schooling: Education for Science in Nineteenth-Century America', *Isis*, 81 (1990), 425-45: 432.

knowledge to non-specialized audiences. Indeed, Dick's efforts to popularize science serve to highlight the ideological nature of popularization. Excluding subjects which he believed constituted a threat to evangelical Christianity (such as phrenology), he popularized instead a theology of nature infused with devotional utterances and scriptural citations which reinforced evangelical beliefs.

'Science' is the last and perhaps the most difficult word of the three to define, as only in the 1870s and 1880s did it emerge as a cultural activity distinct from philosophy and theology. One might best begin by citing Dick's own definition:

Science, in its most general acceptation, denotes *knowledge* of every description; in a more restricted sense, it denotes that species of knowledge which is acquired chiefly by the exercise of the human faculties; and in a still more restricted sense, it denotes that systematic species of knowledge which consists of rule and order: such as geometry, arithmetic, algebra, natural philosophy, geography, astronomy, chemistry, mineralogy, and botany. In the observations which follow, the term may be taken in any one of these senses; but particularly in the last, which is its most common and appropriate meaning.<sup>23</sup>

In this last sense, Dick's definition conforms closely to twentieth-century conceptions of science.<sup>24</sup> Yet on the next page Dick explained that

Scientific investigations... are to be considered as nothing less than inquiries into the plans and operations of the Eternal, in order to unfold the attributes of his nature, his providential procedure in the government of his creatures, and the laws by which he directs the movements of universal nature.... Science... from whatever motives it may be prosecuted, is in effect and in reality, an inquiry after God. It is the study of angels and other superior intelligences...<sup>25</sup>

To Dick, science was a sacred study, one equally as important and holy as the study of Scripture. His definition of science made powerful claims

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<sup>23</sup>Dick, *Future State*, p. 138.

<sup>24</sup>Sir Peter Medawar has defined science as organized knowledge which can be used to predict the behaviour of the sensible world. See *The Limits of Science* (New York, 1984), pp. 3-4.

<sup>25</sup>Dick, *Future State*, p. 139.



within the culture of his day. He was at once resisting the use of 'science' to refer exclusively to evidence from nature without recourse or reference to God, a usage which was beginning to gain authority on the Continent if not in Britain in the 1830s,<sup>26</sup> and he was also seeking to refute detractors of science, among whose members included prominent evangelicals, who questioned the moral worth and religious utility of science. By defining 'science' as 'the study of angels', Dick sought both to inhibit secularization, or the separation of science from other Christian activities, and to establish irrefragably its moral meaning and religious utility, thereby silencing detractors and attracting supporters within evangelical circles.

### 1.3 Thomas Dick and Science and Religion in Context

Dick's life and writings demonstrate the persistence--the enduring attractiveness--of a committed study of nature as a religious activity of great moral efficacy inseparable from the study of Scripture and the worship of God. A study of his life and writings, therefore, provides insights into the relationship between science and religion. Here the work of John Hedley Brooke provides a model and starting point.<sup>27</sup> Brooke has shown how science and religion have in the past interacted in dynamic and complex ways, at times becoming inseparably intertwined. Yet often their interactions have been straitjacketed into untenably simplistic historical categories like 'conflict'

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<sup>26</sup> See A. Cunningham and P. Williams, 'De-centring the "Big Picture": The Origins of Modern Science and the Modern Origins of Science', *BJHS*, 26 (1993), 407-32, esp. 421-25.

<sup>27</sup> J.H. Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge, 1991).

or 'harmony'.<sup>28</sup> In contrast, he shows how ideological, apologetic, social, devotional, and other concerns have often been important, even decisive, factors in relations between science and religion. New practices like German 'higher criticism' of the Bible, which suggested the inherent cultural dependence of Scriptural interpretations, have further complicated the picture. Not only Scripture but evidence from nature itself has proved open to radically different interpretations within contingent cultural settings.<sup>29</sup>

It is now widely accepted that science is a product of an unavoidably cultural and social process of reasoning.<sup>30</sup> Thus historians have proposed new models for relations between religion and science. For J.R. Moore, the nineteenth century witnessed a 'conflict of minds steeped in Christian tradition'. For N.C. Gillespie, this conflict was between different systems of science, the old being grounded in theology and the new in secondary 'scientific' causes. For F.M. Turner, this conflict was between rival professions, with scientists seeking to exclude and ultimately to supplant theologians. While these three models still privilege some form of 'conflict', it is not strictly between science and religion considered as separate ideologies. In contrast, R.M. Young has stressed the ideological continuity between religion and science, with both serving as socially

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<sup>28</sup> J.W. Draper, *History of the Conflict between Religion and Science* (New York, 1874); A.D. White, *A History of the Warfare of Science with Theology in Christendom* (New York, 1955, orig. publ. 1896); R. Hooykaas, *Religion and the Rise of Modern Science* (Grand Rapids, Michigan, 1972).

<sup>29</sup> A particularly fine case study that demonstrates this is G. Gooday, '"Nature" in the Laboratory: Domestication and Discipline with the Microscope in Victorian Life Science', *BJHS*, 24 (1991), 307-41.

<sup>30</sup> See especially S. Shapin, 'History of Science and its Sociological Reconstructions', *History of Science*, 20 (1982), 157-211; idem, 'Social Uses of Science', in G.S. Rousseau and R. Porter, ed., *The Ferment of Knowledge: Studies in the Historiography of Eighteenth-century Science* (Cambridge, 1980), pp. 93-139.

sanctioned theodicies.<sup>31</sup> Here anyone treating relations between religion and science would profit from considering the four questions raised by W.B. Ashworth which he applied to Catholics but which are equally applicable to other denominations.<sup>32</sup> Finally, due to changing meanings and shifting disciplinary boundaries, the appropriateness of categories like 'science' and 'religion' has recently been challenged, accompanied by a call for a more nuanced and contextualized terminology.<sup>33</sup>

Dick himself firmly contested the autonomy and separability implied by the categories 'science' and 'religion'. In his writings, these categories collapsed to produce a God-centred account of nature within an evangelical and devotional framework. For Dick 'science' referred primarily and always to God. From a late-twentieth-century perspective, in which religion and science are usually kept rigidly separated, it is not easy to recover Dick's idiosyncratic blend of science and evangelicalism. Yet Dick's religion and science were intimately connected not just to each other but to the aesthetic, material, and moral concerns of his culture.

#### 1.4 Thomas Dick, His Readership, and the Meanings of His Texts

Following the lead of several recent historians of literature and of science, this thesis suggests that Dick's texts did not have one inherent and

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<sup>31</sup> I follow the summary of D.C. Lindberg and R.L. Numbers, eds., *God & Nature: Historical Essays on the Encounter between Christianity and Science* (Berkeley, 1986), pp. 7-9.

<sup>32</sup> W.B. Ashworth Jr., 'Catholicism and Early Modern Science', in *Ibid.*, pp. 136-66: 136-37.

<sup>33</sup> J. Moore, 'Speaking of "Science and Religion"--Then and Now', *History of Science*, 30 (1992), 311-23. See also D. Lindberg et al., 'Review Symposia: Science and Religion', *Metascience*, 1 (1992), 31-52; D. Lindberg and R.L. Numbers, 'Beyond War and Peace: A Reappraisal of the Encounter between Christianity and Science', *Church History*, 55 (1986), 338-54.

indisputable meaning.<sup>34</sup> Rather, their meanings were negotiated in a dialectic between Dick and his readers during which underlying cultural traditions were created, invoked and sustained. As an author, Dick built some constraints, yet could not rigorously control, the meanings of his texts and the uses to which his readers put them. His readers did not passively consume his texts; rather, they actively interpreted and transformed their meanings, bringing to them assumptions, desires, and expectations which they often shared with sub-cultures to which they professed allegiance.

In the kaleidoscopic range of meanings and uses of Dick's texts which emerged, two points stand out. First, through his texts Dick sought to construct for himself an identity as a Christian philosopher engaged in a holy pursuit of knowledge of nature. He then sought to transmit this thoroughly Christianized form of science to his readers. This brings us to the second point, namely that in the 'marketplace of culture' Dick was clearly unable to predict, nor was he able to control, who his audiences were, any more than he was able to control what meanings were ascribed to his texts. It is striking how his texts were used in ways he could hardly have foreseen by audiences which he could scarce have known existed. For example, educationalists in Connecticut adopted Dick's first three works to provide models of correct composition and proper Christian sentiment for schoolchildren to follow. Another example is provided by Calvinistic Methodists in Wales, who adopted Dick's texts and translated them into Welsh. And the remarkable success of his texts in the United States was entirely unlooked for by Dick.

Keeping in mind the themes and definitions already noted, this thesis

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<sup>34</sup>R. Darnton, 'What is the History of Books?', *Daedalus*, 111 (1982), 65-83; M. Warner, 'Literary Studies and the History of the Book', *The Book: Newsletter of the Program in the History of the Book in American Culture*, 12 (July 1987), 3-9; C.N. Davidson, *Reading in America: Literature & Social History* (Baltimore, 1989). In the history of science, I have found most valuable the works of Jon Topham (cited throughout this thesis).

begins with an extended biographical sketch of Dick's life, focusing on his self-formation as a Christian philosopher. Chapter three places Dick within the British context of natural theology and evangelicalism, wherein he advocated a distinctly devotional and doxological theology of nature. He simultaneously sought to reverse what he saw as the growing secularization of knowledge and to stem opposition to science coming from his fellow evangelicals. Chapter four details Dick's methods of harmonizing science with Christianity by examining his views on, and involvement in, three of the leading scientific debates of his day: the plurality of worlds, the nebular hypothesis, and geology and Genesis.

In chapter five I turn to the aesthetic and socio-political dimensions of Dick's writings. Here Dick urged aesthetic participation in nature within a devotional context which proved powerfully attractive to evangelicals, and which further served to enlarge the audience for his works. With respect to their social and political implications, it is argued that Dick did not seek specifically to coerce workers or to control their behaviour. Rather, he advocated a restructuring of society at all levels through education and the dissemination of Christianized knowledge, which would help towards the ushering in of the millennium. To understand better Dick's impact on the culture of his day, chapter six details the distribution and reception of Dick's writings in Britain through bibliographic surveys of various classes of libraries, studies of the publishing history of Dick's works, and readers' responses in two specific social contexts: among workers in England and Scotland and Presbyterians in Wales. Finally, chapters seven and eight demonstrate Dick's extraordinary influence in antebellum America, the former suggesting that Dick's doxological theology of nature fitted perfectly both Americans' enthusiasm for evangelicalism and desire for self-improvement, and the latter demonstrating the meanings and manifold uses of astronomy in

American culture, including its uses by evangelicals and women's role in astronomy as revealed in the pages of children's literature. I conclude by suggesting that the decline of devotional theologies of nature, such as Dick's, was less precipitous than is commonly held by historians.

## Chapter 2

### Becoming a Christian Philosopher: A Sketch of Thomas Dick's Life

[H]e came running out with the activity of a boy, and gave me one of the most affectionate greetings I ever had from anybody.... I found him in person rather below the middle size, though well proportioned, with a face and manner well becoming a "Christian Philosopher".... He seemed to me to possess, in a very uncommon degree, the spirit of an enlarged philanthropy.

William Buell Sprague upon meeting Dick for the first time in 1836.<sup>1</sup>

#### 2.1 From Weaver's Son to Secessionist Minister: Dick's First Thirty Years

Thomas Dick was born on 24 November 1774 in the Hilltown of Dundee and died at home in Broughty Ferry, near Dundee, on 29 July 1857.<sup>2</sup> He spent his youth at the tail end of the Scottish Enlightenment; came of age during the French Revolution and the Napoleonic Wars; became a well-known writer during the struggles over reform and the rise of Chartism in the 1820s and 1830s; and lived his last years during the triumphal Great Exhibition of 1851 and the political stability of the mid-Victorian era. In his lifetime he saw Dundee's population quadruple and its shipping tonnage nearly septuple; he saw steam ships, locomotives and other products of the industrial revolution supplement

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<sup>1</sup>W.B. Sprague, *Visits to European Celebrities* (Boston, 1855), pp. 290-92.

<sup>2</sup>Sources that contain useful biographical information include D. Gavine, 'Thomas Dick, LL.D., 1774-1857', *Journal of the British Astronomical Association*, 84 (1974), 345-50; H. Macpherson, 'Thomas Dick: "The Christian Philosopher"', *Records of the Scottish Church History Society*, 11 (1955), 41-62; E.G. Hutcheson, 'Thomas Dick, LL.D., F.R.A.S., Astronomer and Reformer', *The People's Friend*, (29 July 1901), 532; A.M. Clerke, 'Dick, Thomas', *DNB*, V, 923; Anon., 'Thomas Dick, LL.D.', *Littell's Living Age*, 61 (16 April 1859), 131-36; M.F. Conolly, *Biographical Dictionary of the Eminent Men of Fife* (Cupar, Fife, 1866), pp. 141-43; W. Anderson, *The Scottish Nation*, 3 vols. (Edinburgh, 1869), III, 704-7; W. Norrie, *Dundee Celebrities of the Nineteenth Century* (Dundee, 1873), pp. 167-72; J. Thomson, *History of Dundee*, rev. by James MacLaren (Dundee, 1847, 1874), pp. 376-79; Anon., 'Portrait Gallery. Thomas Dick, LL.D.', *Hogg's Instructor* (27 Apr. 1850), 145-47. This last biographical sketch, written before Dick's death with his knowledge and approval, was the most important source for later commendatory biographies of Dick.

sailing ships and horse-drawn carriages;<sup>3</sup> and, of more immediate importance to him personally, he saw 'scientists' (a word first used by William Whewell in 1834)<sup>4</sup> begin to supplant his fellow 'Christian philosophers' of the eighteenth and early nineteenth centuries.

Dick was the youngest of three children of Mungo and Margaret née Stroak.<sup>5</sup> Their neighbourhood of the Hilltown would be described in 1838 as a 'motley built locality' of 'grotesque and irregular appearance'.<sup>6</sup> It lay in the northern end of Dundee, east of the town centre. Steep streets led to wooden houses occupied by artisans who relied for their livelihood on Dundee's principal manufacture of linen of various kinds. Mungo was typical. A handloom weaver of moderate means (sufficient to employ at least one servant),<sup>7</sup> he also served as treasurer for the Bell Street Church of

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<sup>3</sup>These changes are set within a Scottish context in T.M. Devine and R. Mitchison, eds., *People and Society in Scotland: Volume I, 1760-1830* (Edinburgh, 1988).

<sup>4</sup>See S. Ross, 'Scientist: The Story of a Word', *Annals of Science*, 18 (1962), 65-85.

<sup>5</sup>Dick's sister Elizabeth (b. 1772) survived into old age, but his brother James (b. 1770) apparently died soon after birth. It is possible that Dick had three older half-sisters, for records at the parish of Mains & Strathmartine (two miles from the Hilltown of Dundee and on a direct road) show a Margaret Stroak marrying a Thomas Dick in 1757, with three daughters born between 1758 and 1762. Perhaps this Margaret was one and the same person, with Mungo marrying in 1769 his brother's or cousin's widow. A further connection exists in that Mungo was a linen manufacturer, and Mains & Strathmartine was a linen-bleaching neighbourhood. Here I am greatly indebted to David Gavine, who noticed this connection and sent me a detailed genealogy for Dick's family.

<sup>6</sup>C. Mackie, *Historical Description of the Town of Dundee* (Glasgow, 1836), p. 154. An ancient barony, Hilltown in earlier centuries had been known as Rotten-Row and also as Bonnethill since in the late sixteenth and seventeenth centuries many bonnetmakers had lived there.

<sup>7</sup>Handloom weavers in 1780s and 1790s experienced prosperous times, during which their earnings were comparable to those in skilled trades. See J. Burnett, *Idle Hands: The Experience of Unemployment, 1790-1990* (London, 1994), pp. 47-50; N. Murray, *The Scottish Handloom Weavers 1790-1850: A Social History* (Edinburgh, 1978); and T.C. Smout, *A History of the Scottish People 1560-1830* (London, 1969, 1985), pp. 237, 393-402.



Dundee.<sup>8</sup> This 'spacious, elegant and substantial' edifice on the west side of Constitution at Bell Street served as the meeting place for Antiburgher Seceders. Including children and occasional attenders, it had in 1792 about 650 members.<sup>9</sup> Seceders were known for their 'puritanism, fiery oratory, fierce discipline and internal rancour'.<sup>10</sup> But Mungo was reputedly more broadminded and tolerant than most. He built a respectable library of books on and was well-read in theology and ecclesiastical history. Margaret taught Thomas to read the New Testament before he entered school. He was by his own account a serious-minded and religious boy, given to imaginative, and at times disturbing, musings about the heavens and God.

An important moment in his life came on 18 August 1783, when a sensationally large and bright meteor blazed through the early evening sky over his head. Both thrilled and terrified, young Thomas fell prostrate to the ground, apparently expecting fire to consume the world as foretold in Revelation. The world continued as before, but, as contemporary biographies would have it, from that instant his life changed. These biographies attributed his lifelong devotion to science, and particularly to astronomy, to this ecstatic encounter with the celestial evidence of God's omnipotence. Without quite describing this as an epiphanic and epochal event in his life, however, Dick himself later wrote of his great alarm at, and vivid

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<sup>8</sup>R. Small, *History of the Congregations of the United Presbyterian Church from 1733 to 1900*. 2 vols. (Edinburgh, 1904), I, 286-94.

<sup>9</sup>On Bell Street Church see C.C. Maxwell, *A Historical and Descriptive Guide to Dundee* (Dundee, 1858), p. 63; R. Small, *The History of Dundee* (Dundee, 1793, 1842), p. 63.

<sup>10</sup>C.G. Brown, *The Social History of Religion in Scotland since 1730* (London, 1987), pp. 34-37; idem, 'Religion and Social Change', in Devine and Mitchison, eds., *People and Society in Scotland*, pp. 143-62; A.L. Drummond and J. Bulloch, *The Scottish Church 1688-1843: The Age of the Moderates* (Edinburgh, 1973), pp. 110-11, 142.

recollection of, this meteor.<sup>11</sup>

From St. Paul to Martin Luther to René Descartes to Robert Boyle, many lives have reputedly been redirected in religious channels by spectacular encounters with God's power. Such rapturous conversions--a common enough biographical trope--were of particular interest to evangelicals, who placed a premium on intensely personal and emotional encounters with God. Whether Dick, who was already a lamb within the Secessionist fold, was truly transformed by the fear and awe he felt in witnessing this heaven-sent sign cannot be definitively determined. But hereafter he did study the heavens with a crusader's zeal. He begged old spectacle lenses from neighbours, built a lens-grinding machine and his own telescopes and microscopes, and resisted his parents' attempts to put him to the loom. 'O, Tam, Tam!', his mother once exclaimed, 'ye remind me o' the folk o' whilk the prophet speaks, "who weary themselves in the fire for very vanity"'. His perplexed and perhaps dismayed father admitted, 'I ken nae what t' dae wi' that laddie Tam, for he seems t' care for naething but books and glasses. I saw him the ither day lying on the green trying to turn the steeple o' St Andrew's Kirk upside down wi' his telescopes'.<sup>12</sup>

Mungo wanted his only surviving son to follow in his footsteps as a handloom weaver. Yet while Tam dutifully toiled at the loom, he ardently read books propped open upon a wooden stand he constructed especially for this purpose (interestingly, David Livingstone did the same at a cotton mill in his youth).<sup>13</sup> His attention was often focused upon Benjamin Martin's *The Young*

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<sup>11</sup>He recounted his experience in *Christian Philosopher*, I, 160.

<sup>12</sup>'Portrait Gallery: Thomas Dick', 146. Presumably, Dick supplied these recollections to Hogg's *Instructor*.

<sup>13</sup>R. Mackenzie, *David Livingstone: The Truth behind the Legend* (Eastbourne, 1993), p. 26. Elizabeth Gaskell, in her novel *Mary Barton*, wrote of hand-loom weavers who 'throw the shuttle with unceasing sound, though Newton's *Principia* lie open on the loom, to be snatched at in work hours, but

*Gentleman and Lady's Philosophy*, a popular book on science which he bought when he was thirteen. Childhood attacks of smallpox and measles, together with his natural temperament, rendered him unfit for further strenuous physical labour. By the age of sixteen, he had become a student-teacher in a Dundee school and was studying Latin to prepare for the University of Edinburgh. A student at Edinburgh by the age of twenty, he supported himself by private tutoring, somehow saving enough money to buy the eighteen-volume, third edition of the *Encyclopaedia Britannica*. He was fortunate to be at the University of Edinburgh when it was at its peak of intellectual activity and renown.<sup>14</sup>

It is not too soon to identify some of the formative influences on Dick's life. First and foremost, he was brought up in an evangelical household wherein one might expect fervid piety and an emphasis on God's sublimity, Christ's redemption and man's depravity to have been the norm. From his first clumsy attempts to read the Bible at his mother's knee to his excursions into his father's library (dominated by works on theology and church history), Dick's life would have centred on God. Second, his astonishment as a young boy at witnessing the meteor must have helped to convince him of the power of nature--and especially of astronomical phenomena--to move others to draw moral lessons from nature and to affirm the omnipotence of God. Third, Martin's *Philosophy* provided him with a model of scientific popularization and a vision of science as knowledge fit for angels; while the *Britannica's* articles exposed him to the latest theories of natural

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revelled over in meal times, or at night'. *Mary Barton: A Tale of Manchester Life* (1848; reprinted by Penguin, 1994), p. 34.

<sup>14</sup>See J.B. Morrell, 'The University of Edinburgh in the Late Eighteenth Century: Its Scientific Eminence and Academic Structure', *Isis*, 62 (1971), 158-71.

philosophy and how they portrayed evidence of God's design.<sup>15</sup> Dick would later integrate these influences in his own writings, with the need to worship God remaining the central and all-pervasive influence in his life and works.

Meanwhile, he had to get through Edinburgh. In 1795 he interrupted his studies to teach at the Orphans' Hospital in Edinburgh. After two years here, he returned to the university and began in earnest to study theology and Scripture. But once again he had to turn to teaching to support himself, this time at the school of Dubbieside, near Leven in Fife. From here he moved to a school at Path of Condie, a tiny hamlet tucked away in the Ochil Hills in Perthshire, where he first started writing and publishing essays.<sup>16</sup> Like the great majority of students at this time, he did not take the M.A. degree at Edinburgh, which involved extra fees. More important than paper credentials would have been the education he received at Edinburgh, perhaps in particular his classes with John Robison, Professor of Natural Philosophy from 1774 to 1805. (As a Divinity student, Dick would have been required to take classes with Robison.) Dick would later write that Robison was 'one of the most profound mathematicians and philosophers of his age' largely because he always emphasised final causes and evidence of design in nature.<sup>17</sup>

Mention of Robison's name raises interesting issues of religion and politics. Jack Morrell has conclusively demonstrated that Robison used Newtonian voluntarism--the idea that God unceasingly superintends and supports His universe and its laws--to counter Joseph Priestley's and Thomas Paine's deistic writings and their supposedly corrosive effects on the moral order and

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<sup>15</sup>A. Hughes, 'Science in English Encyclopedias, 1704-1875', *Annals of Science*, 7 (1951), 340-70; 8 (1952), 323-67.

<sup>16</sup>'Portrait Gallery. Thomas Dick', 146. I have not discovered any references to these essays.

<sup>17</sup>Dick, *Improvement of Society*, pp. 469-70. In Dick's opinion, Robison was 'scarcely the inferior [of] the celebrated Euler' (p. 472).

stability of society. In 1792, at the height of the French Revolution, Scotland experienced severe social disturbances. That November, Dick, who was teaching in Dundee, may have witnessed, and certainly would have known about, the planting of at least two 'Trees of Liberty' by radicals in Dundee's High Street. One of these trees, bearing the scroll 'Liberty, Equality and no Sinécures' and decorated with apples and lit by a lantern and candles, was apparently first planted, then dug up and paraded around a large bonfire, and later fixed to the front of the Town House. Alexander Riddoch, Lord Provost of Dundee, was persuaded to walk round this or a different tree three times with his hat off shouting 'Liberty and equality forever!'.<sup>18</sup> In the early morning of 25 November, a Sunday and the day after Dick's eighteenth birthday, Riddoch had the most recently planted Liberty tree surreptitiously uprooted and hidden away in 'the Thief's hole', a cellar in the bowels of the Town House.<sup>19</sup> Two troops of Dragoons arrived the next day to discourage further plantings.

Economic conditions gradually improved in Scotland after 1793, and, since stern measures were implemented by the authorities, who were aided by the Terror in France, the viciousness and frenzied nature of which dulled the enthusiasm of those with only lukewarm desires for reform, such disturbances grew less frequent and intense. Yet the memories and fear which they had

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<sup>18</sup>This colourful story is cited in J. Thomson, *The History of Dundee*, p. 136; in J.A. Rollo, *Dundee Historical Fragments* (Dundee, 1911), pp. 134-36; and in H.W. Meikle, *Scotland and the French Revolution* (Glasgow, 1912), pp. 96-7, 100. In the main I have relied on K.J. Logue's *Popular Disturbances in Scotland, 1780-1815* (Edinburgh, 1979), pp. 148-54, esp. 150-52. Logue does not mention this incident with the Lord Provost, perhaps because in his account he relies on Riddoch's private correspondence, who was probably loath to admit his capitulation to the crowd. Also useful is W.H. Fraser, *Conflict and Class: Scottish Workers 1700-1838* (Edinburgh, 1988), pp. 65-71. For Morrell's account see footnote 20 below.

<sup>19</sup>It was later replanted on Belmont House grounds, where it became a 'goodly tree'. J. Thomson, *History of Dundee*, p. 136. It was still thriving in 1923, according to A.H. Millar, *Haunted Dundee* (Dundee, 1923), pp. 76-81.

produced lived on. Robison, Jack Morrell notes, saw a conspiracy behind such social turmoil, publishing in 1797 his *Proofs of a conspiracy against all the religions and governments of Europe, carried on in the secret meetings of free masons, illuminati, and reading societies*. A fervid Baconian and Newtonian, Robison declared in 1804 that he was always keen to show his students that nature's laws 'were beautiful Marks of Wisdom, prompted by Beneficence' and that 'in the present day [this view] cannot be too much kept in sight, when our Neighbours on the Continent are doing everything in their power... to banish the thought of an Artist, the Author and Preserver of this fair World'.<sup>20</sup> Robison espoused Newtonian voluntarism precisely because it countered perfectly this atheistic and Continental conspiracy.

It is revealing here to compare Dick's unalloyed praise of Robison with an equivocal statement which he made about John Playfair, Robison's successor at Edinburgh. In 1833 Dick confessed 'We know not whether such sentiments [like those godly ones expressed by Robison in 1804] were inculcated from the chair of Natural Philosophy... by the distinguished philosopher [Playfair] who has lately deceased'.<sup>21</sup> Unlike his predecessor, Playfair's policy, in Jack Morrell's words, 'was clearly to either smoothly ignore or genially minimize the religious problems associated with natural philosophy', and he rejected Robison's 'conspiracy theory' with respect to the social turmoil of the 1790s.<sup>22</sup> Dick was probably aware of Playfair's less-than-wholehearted embrace of natural theology and found it too weak for his taste, but he was perhaps reluctant to criticize openly a man of Playfair's high reputation and accomplishments.

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<sup>20</sup> J.B. Morrell, 'Professors Robison and Playfair, and the *Theophobia Gallica*: Natural Philosophy, Religion and Politics in Edinburgh, 1789-1815', *Notes and Records of the Royal Society*, 26 (1971), 43-63: 48-51.

<sup>21</sup> Dick, *Improvement of Society*, p. 470.

<sup>22</sup> J. Morrell, 'Professors Robison and Playfair', 52-59, esp. 58-9.

Aided by Robison's ministrations in natural theology, Dick did not succumb to the decidedly secular ethos of the University of Edinburgh.<sup>23</sup> In 1801 he entered the Theological Hall of the General Associate (or Antiburgher) Synod of the Secession church and studied for the ministry under Rev. Archibald Bruce.<sup>24</sup> Licensed the same year, he officiated as a probationer for a short time around various parts of Scotland. Called to the Viewfield Antiburgher congregation of Stirling, he was ordained there on 30 November 1803 as the assistant to John Heugh, who was in his early seventies and preparing to retire. Next August, he married Elisabeth Aedie, sister<sup>25</sup> of the Rev. Andrew Aedie of Forfar, and soon after was appointed Moderator of the Stirling Presbytery.

## 2.2 From Disgraced Minister to Successful Author: Dick's Next Twenty Years

Newly married and, at the age of thirty, in the prime of his life, Dick must at this point have felt that a respectable and relatively prosperous career for himself as a minister was assured.<sup>26</sup> Yet a devastating scandal which precipitated a profound spiritual and psychological crisis in his life erupted soon thereafter. It emerged that he had carried on an adulterous affair with Betty Ker, his female servant, which resulted in pregnancy. For this 'flagrant immorality', he was deposed and excommunicated by the Stirling

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<sup>23</sup>Edinburgh is so described by J. Morrell, 'University of Edinburgh', 167.

<sup>24</sup>On Bruce and his curriculum see J. M'Kerrow, *History of the Secession Church* (Glasgow, 1841), pp. 781-83.

<sup>25</sup>Or daughter: sources conflict here.

<sup>26</sup>On the character, roles and status of ministers see B. Heeney, *A Different Kind of Gentleman: Parish Clergy as Professional Men in early and mid-Victorian England* (Hamden, Connecticut, 1976).

Presbytery on 17 December 1805.<sup>27</sup> When in the next year both his wife's and servant's babies died within a few days of birth (his wife's before baptism), Dick saw it as God's just punishment for his transgression. When he informed the Presbytery on 2 April of his 'great distress and perplexity of mind', it referred his case to the General Synod, which revoked the sentence of excommunication and restored him to full Church membership, though not of course to the ministry.<sup>28</sup>

The details of Dick's adultery are revealing of his character. The Session minutes indicate that he never denied the 'calumny' (as it was termed) but that he was reluctant at first to admit it. Within two weeks, however, he did admit intercourse, 'not frequent, but repeated'. Confronted with a statement from Betty Ker, Dick admitted that he had been guilty before and 'frequently guilty after his marriage', and that he had 'used engaging words' and had twice sent for Betty when his wife was away. Presumably, his wife had had her suspicions, since she dispensed with Betty's services about three months prior to the affair coming to light. She later agreed to re-hire her, with no reason given for the reversal.<sup>29</sup> These details suggest that Dick's first marriage was perhaps solely one of convenience; certainly, his call for the ministry proved insufficiently strong to regulate his behaviour. His character besmirched, Dick now had to rehabilitate himself.

He would discover that forgiveness for his malfeasance was not to be

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<sup>27</sup>R. Small, *United Presbyterian Church 1733-1900*, II, 671. C.G. Brown observes that 'Cases of fornication and drunkenness were quite common amongst dissenting clergy and elders'. See his *Social History of Religion in Scotland*, p. 108.

<sup>28</sup>'Minutes of Stirling Associate Presbytery', pp. 516-35, Central Regional Archives, Stirling, MS CH3/286/2. I am indebted to David Gavine for sharing this information with me.

<sup>29</sup>For all of these details see *Ibid.*



freely extended by all.<sup>30</sup> In the light of this, Dick's condemnation in 1826 of those haughty, severe, and unchristian souls who continued to censure adulterers and thieves long after they had proved themselves sincere in their remorse and repentance takes on new, and crucially important, meaning:

A person guilty, in a single instance, of a breach of the seventh or eighth commandments, will lie under the frown of a religious society for years, and even to the close of his life, notwithstanding every evidence he can give of the sincerity of his repentance, and even be deprived of the means of earning his subsistence; while another may habitually violate almost all the other precepts of the decalogue, and be screened from the discipline of the church.<sup>31</sup>

This poignant and somewhat bitter passage, to the best of my knowledge, is the sole occasion upon which Dick revealed in his writings a trace of the chastisement he must have had to endure while struggling to regain the confidence and approbation of respectable society after his defrocking.

It is reasonable here to venture a few conjectures about Dick's mental state. More so than his youthful encounter with the meteor, this scandal, which not surprisingly went unmentioned in standard biographical accounts, was the defining event in his life. Before his fall from grace, he had been a respectable minister whose socio-professional identity and religious status as one of the elect were secure. The trauma of having betrayed his wife and congregation, his subsequent defrocking, and the weight on his conscience of the deaths of two babies would have flung him back on his faith, family and friends. Oppressed by guilt (after his sin, he set aside time 'for fasting,

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<sup>30</sup>Dick's character would be questioned in 1814 by James McEwan (1786-1859), then a divinity student and later minister of the First Antiburgher of Strathaven, Hamilton, but it seems McEwan was forced to recant his 'slander'. Dick's record otherwise appears spotless after 1806. For the incident with McEwan see DCA GD/x33/1/1-2 and GD/Mus 54/9/1.

<sup>31</sup>Dick, *Philosophy of Religion*, p. 455. As T.C. Smout notes, from the sixteenth century onwards, sins like pride or greed attracted far less attention and were dealt with more leniently than sexual misdeeds, to the point where immorality became almost exclusively defined as sexual immorality. See his *A History of the Scottish People*, p. 77.

humiliation and confession'),<sup>32</sup> he somehow had to reconstruct his socio-professional identity, regain the respect of his family and peers, and testify to his restored piety.

In a process of 'self-modelling', a term I borrow from Michael Shortland's work on the Scottish geologist Hugh Miller,<sup>33</sup> I believe Dick sought to fashion for himself a new identity as a 'Christian philosopher' in the tradition of Robert Boyle and other eminent natural philosophers who in the past had combined a study of nature with sincere piety and devout worship of God.<sup>34</sup> Shortland argues convincingly that Miller modelled himself on a concept of manliness. But, as Stephen Greenblatt contends, self-formation is perpetually challenged by the concept of some 'Other',<sup>35</sup> which must be combatted and suppressed. Shortland suggests the 'female' played this role in Miller's self-modelling.<sup>36</sup> I believe the 'Christian philosopher' was Dick's concept for self-modelling, with the 'Other' being what he termed in a different context the 'intelligent demon'. This 'Other' pursued knowledge independent of religious concerns and typically gave vent to its lusts. As a demon it got paid for its sins with the wages of eternal damnation (hell was very real for Dick). With death often striking without any apparent warning in the early 1800s, and with a strong desire to atone for past mistakes to prepare for an immortal existence in the hereafter, Dick would have wanted,

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<sup>32</sup> 'Minutes of Stirling Associate Presbytery', MS CH3/286/2.

<sup>33</sup> M. Shortland, 'Bonneted Mechanic and Narrative Hero: The Self-Modelling of Hugh Miller', in Shortland, ed., *Hugh Miller: New Essays on his Life and Work* (Oxford, forthcoming in 1995). My thanks to Michael Shortland for sending me a typescript of his chapter.

<sup>34</sup> S. Shapin, '"A Scholar and a Gentleman": The Problematic Identity of the Scientific Practitioner in Early Modern England', *History of Science*, 29 (1991), 279-327: 299-304.

<sup>35</sup> S. Greenblatt, *Renaissance Self-fashioning: From More to Shakespeare* (Chicago, 1980).

<sup>36</sup> M. Shortland, 'Bonneted Mechanic', pp. 5-13.

with great urgency, to testify to his restored piety and to justify his own intellectual pursuits as being suitable to an upright, godly life within a strict Secession church.

Made deeply aware of his own lamentable failings by passing through a shattering period of self-examination, no longer able to bear witness to his restored piety by preaching God's Word in the pulpit, bereft of a vocation among Seceders who placed a premium on performing godly work, Dick fell back on the skills which had served him in the past: teaching, practising astronomy, and writing. He returned to teaching, first in Stirling and then in 1807 at Methven, a village near Perth, at the invitation of a friend, the Rev. John Jameson.<sup>37</sup> At Methven, he served as parish schoolmaster for ten years, a humbler, less remunerative,<sup>38</sup> and more constrained position than minister but one in which he could demonstrate his piety while performing useful, godly work.

As a Secessionist schoolmaster, Dick would most likely have served as precentor and kirk-session clerk. His work would have been closely inspected by the Presbytery and his students tested on their knowledge of the Bible and the catechism.<sup>39</sup> Dick would later criticize school officials both for stifling the innate curiosity of children by unduly emphasizing rote memorization and recitation of Biblical passages and the shorter catechism, and for insisting on curricula that allowed little opportunity for more stimulating illustrations of God's attributes, in particular illustrations

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<sup>37</sup>Rev. David Nicol of Aberlady said that Jameson was 'the godliest man he ever knew'. That he stood by Dick in his hour of need corroborates this statement. See R. Small, *United Presbyterian Church 1733-1900*, II, 621.

<sup>38</sup>Drummond and Bulloch mention one schoolmaster who, by serving as a clerk and by collecting poor rates and road-money, increased his yearly salary to £70. However, this was still only half of what a typical minister earned. See their *Scottish Church 1688-1843*, p. 76.

<sup>39</sup>C. Brown, *Social History of Religion in Scotland*, pp. 98-99.

drawn from nature and the sciences.<sup>40</sup> Because they disregarded or devalued the latter, Presbyteries and ministers--the very audience Dick perhaps sought to impress most--called into question the usefulness and sanctity of his own studies in science and thus his self-identity.

A friend of Dick's, the satirist, naturalist and political reformer Robert Mudie,<sup>41</sup> supplied in 1825 an interesting description of the typical provincial schoolmaster:

not unfrequently the son of humble parents, who, finding that he evinced talents and a taste for learning, sent him to school... till he was qualified for orders; but who, finding his influence insufficient for procuring him the ease and indolence of a parsonage, took, as his only alternative, the humbler and more laborious, but unquestionably more useful, office of parish schoolmaster.<sup>42</sup>

One wonders whether this description--with its echoes of the parsonage he had lost and of the 'humbler, more laborious, but more useful' position he gained in its stead--would have rankled with or rejuvenated Dick. What certainly did rankle with him were the low salaries and correspondingly uncertain social status of schoolmasters. When he was its editor in 1835, the *Educational Magazine* complained that 'a very large majority' of British schoolmasters' salaries 'do not amount to more than L60, being below the wages of the commonest mechanic'. The 'extreme poverty and destitution' which resulted brought the schoolmaster 'down to the common level of low life' and cut him off 'from all opportunities of [intellectual] improvement, except he makes the Penny Magazine as his oracle'. In the opinion of the *Educational Magazine*,

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<sup>40</sup>Dick, *Christian Philosopher*, Preface to 2nd ed. (1824); *Future State*, p. 48.

<sup>41</sup>Son of a weaver, teacher at a Dundee school from c.1808-20, Dundee city councilman and editor of the *Dundee Advertiser*, Mudie, like Dick, sought respectability and fame through writing. His satires proved offensive to some, however, and he was apparently offered a bribe to leave Dundee, which he seems to have accepted, moving to London. See J. Thomson, *History of Dundee*, pp. 142-45.

<sup>42</sup>R. Mudie, *The Modern Athens: A Dissection and Demonstration of Men and Things in the Scotch Capital* (London, 1825), p. 259.

and therefore in Dick's view, a schoolmaster should 'be entitled to a high social place, and would be worth, and must have, an income sufficient to keep him respectable'. And Dick went even further in his *Mental Illumination* (1835), declaring that schoolmasters, when properly educated and trained, deserved to be accorded the same level of respect enjoyed by 'the most dignified clergyman'.<sup>43</sup>

Dick's tenure as a schoolmaster at Methven saw him in the vanguard of education reform. He became a leading actor in the 'popular enlightenment' spreading through the towns and rural parishes of the Scottish lowlands.<sup>44</sup> Slowly but surely he was succeeding with his self-modelling. Seeking ways to gain a higher salary (he and his wife now had three young children to support),<sup>45</sup> to extend his social sphere, and to win a wider audience for his beliefs and literary efforts, he began classes on science for the public. Like George Combe, Charles Lyell, and Robert Chambers,<sup>46</sup> Dick also sought a reputation by writing for a polite, middle class audience. As one friend wrote to him in 1815, 'With respect to your literary correspondance [sic] you are climbing by hasty strides up the hall of Fame'.<sup>47</sup> He won even more fame

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<sup>43</sup>See 'Review of James Simpson's Necessity of Popular Education' and 'British Schoolmaster', *The Educational Magazine*, and *Journal of Christian Philanthropy*, and of *Public Utility*, 1 (1835), 41, 168-69; and *Mental Illumination*, pp. 337-44. Dick may possibly have nursed a deep-seated sense of outrage here because of personal experience. Upon the death of his first wife, he was reportedly too poor to look after, or to hire somebody else to look after, his youngest daughter Ann. She was adopted by an uncle on her mother's side. See A. Lowson, *Portrait Gallery of Forfar Notables* (Aberdeen, 1893), pp. 75-6.

<sup>44</sup>L.J. Saunders, *Scottish Democracy 1815-1840: The Social and Intellectual Background* (Edinburgh, 1950), pp. 248-58.

<sup>45</sup>One son had died at the age of three in Dec. 1816 or early Jan. 1817.

<sup>46</sup>R. Cooter, *The Cultural Meaning of Popular Science: Phrenology and the Organization of Consent in Nineteenth-Century Britain* (Cambridge, 1984), p. 108.

<sup>47</sup>Thomas Rattray to Dick, 29 Apr. 1815, DCA GD/x33/1/1.

by forming in Methven a rudimentary mechanics' institute, which included a lending library.<sup>48</sup>

To encourage others in this direction, he penned a series of articles, published in the *London Monthly Magazine* from 1814 to 1815, which together constituted a full-scale proposal for the general establishment of mechanics' institutes.<sup>49</sup> He urged the creation of 'literary and philosophical societies, among the middling and lower ranks of the community, in every town and populous village, for the purpose of diffusing general information, as well as for making improvements and discoveries in art and science'. He stressed that lessons in Christian morality would share equal billing with useful knowledge; this combination would have seemed wise and essential to his middle-class audience, since the seditious nature of knowledge divorced from Christianity seemed irrefragably proven by the French Revolution. Morally sound knowledge, in Dick's view, would fortify people against the scepticism of deists, the superstitions of the credulous and uninformed, and the enthusiasm of religious sectarians. Only 'minute discussions on politics and revealed religion', but not such topics as the nature of God and the

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<sup>48</sup>By 1850 this library contained two thousand volumes. See 'Portrait Gallery: Thomas Dick', 146. It still existed in 1901, according to E.G. Hutcheson, 'Thomas Dick', *The People's Friend* (29 July 1901), 532.

<sup>49</sup>T. Kelly, *George Birkbeck: Pioneer of Adult Education* (Liverpool, 1957), pp. 68-9. Dick claimed that his proposal served to encourage the founding of such an institute in 1816 or 1817 in the vicinity of London, to which he was granted honorary membership. This may have been the journeyman mechanic Timothy Claxton's institute. See *Mental Illumination*, p. 399. There is no point in asserting that Dick made the first proposal for mechanics' institutes. On such questions, as Ian Inkster notes, origins cannot be separated from how one defines these institutes and their functions. He shows this by listing several, equally plausible, precursors for mechanics' institutes. See I. Inkster, ed., *The Steam Intellect Society--Essays on Culture, Education and Industry circa 1820-1914* (Nottingham, 1985), pp. 4-5. Dick was recognized by his contemporaries as being one of the first proponents of mechanics' institutes, though his ideas 'seem to have scarcely attracted any notice', according to J. Hole, *An Essay on the History and Management of Literary, Scientific, & Mechanics' Institutions* (London, 1853), p. 8.

immortality of human souls, would be excluded.<sup>50</sup>

Along with writing and teaching, Dick continued to hone his skills and credentials in astronomy. At Methven, he had observed his first comet on 8 October 1807 and spied the great comet of 1811 one or two days too late to gain the distinction of discovering it.<sup>51</sup> By making astronomical observations in the daytime, he made a solid claim for originality, presenting his results in 1813 in a paper which he read before the Dundee Rational Institution, a literary and philosophical society.<sup>52</sup> Such provincial societies, Jack Morrell notes, 'provided a local focus of activity where meetings, lectures, a library, sometimes apparatus, an opportunity for publication, social legitimation, and the satisfactions of power, vanity, and emulation were all to be savored'.<sup>53</sup> As a humble but ambitious village schoolmaster, perhaps social legitimation was what Dick desired most. Here he would have rubbed shoulders with solicitors, medical men, and other prominent members of the professional and upper middle classes.

In his published paper, Dick wrote that his observations of Venus had rendered untenable the claim of notable experts in astronomy, such as David Brewster, that Venus could not be seen with a telescope during her superior conjunction with the Sun. Showing some slight insecurity as to his own social

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<sup>50</sup> *The Monthly Magazine; or, British Register*, 37 (Apr. and July 1814), 219-21, 507-10; 38 (Aug. and Sept. 1814, Jan. 1815), 23-25, 121-22, 503-06. These articles are discussed by L.J. Saunders, *Scottish Democracy 1815-1840*, pp. 256-57; and by J.V. Smith, 'Manners, Morals and Mentalities: Reflections on the Popular Enlightenment of Early Nineteenth Century Scotland', in W.M. Humes and H.M. Paterson, ed., *Scottish Culture and Scottish Education, 1800-1980* (Edinburgh, 1983), pp. 25-54. In chapter five I discuss Dick's views on mechanics' institutes, education, and social reform at greater length.

<sup>51</sup> Dick, *Sidereal Heavens*, pp. 308-10.

<sup>52</sup> Founded in 1810, the Dundee Rational Institution had a library, some philosophical apparatus, and a small museum. It lasted only a few years.

<sup>53</sup> J.B. Morrell, 'Individualism and the Structure of British Science in 1830', *Historical Studies in the Physical Sciences*, 3 (1971), 183-204: 194.

status and credibility as a disinterested observer, he added that his friend, 'the Reverend J. Jameson, of Methven, a gentleman of literary acquirements', had also clearly seen Venus through his telescope.<sup>54</sup> He subsequently related to his readers that his observations had been judged 'new facts' in astronomy by 'the celebrated Mr. [John] Playfair, professor of natural philosophy in the university of Edinburgh...'.<sup>55</sup> Forty years later these formed the basis for a paper which he published after he was elected a Fellow of the Royal Astronomical Society in 1853.<sup>56</sup>

Dick's efforts in astronomy, the papers which he gave at literary and philosophical societies, and his publications were probably instrumental in his gaining an improved situation as a schoolmaster. In 1817 he left rural Methven for Perth and a post as schoolmaster at Stewart's Free Trades' School. Congratulating him on his new post, the Rev. John Murray wrote that 'your sphere of personal improvement, and also of usefulness is considerably enlarged--you will enjoy it the more after the difficulties you have had to encounter in the way to it....'<sup>57</sup> Dick stayed at Stewart's for ten years, teaching English grammar, writing, and arithmetic to children aged between seven and fifteen, his salary being approximately £70-£85 per year.<sup>58</sup> That

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<sup>54</sup> 'Observations on the Celestial Bodies, made in the day-time', 115-18. For an abstract see 'Mr. Dick on the Visibility of Venus', *Monthly Magazine*, 37 (Feb. 1814), 18-19. His observations were cited by Thomas Thomson in his 'Sketch of the Improvements in Science made during the Year 1813', *Annals of Philosophy*, 3 (1814), 1-32: 4.

<sup>55</sup> Dick, *Celestial Scenery*, p. 74, n. 1.

<sup>56</sup> Dick, 'On Celestial Day Observations', *Monthly Notices of the Royal Astronomical Society*, 15 (11 May 1855), 222-23.

<sup>57</sup> J. Murray to Dick, 20 Jan. 1817, NLS MS 9658 ff 15-16. One of the difficulties to which Murray alluded may have been McEwan's 'slander'. McEwan had questioned Dick's moral fitness for an unspecified post (see note 30).

<sup>58</sup> 'Terms and Conditions of the Appointment of a Teacher to Stewart's Free Trades' School of Perth', DCA GD/Mus 54/6. No date given but written about when Dick retired in 1827. This statement mentions the new teacher would be required to teach 96 students in day class and 24 in evening class. Dick



he was able to teach these subjects, without being monitored by his fellow Seceders as he had been at Methven, probably came as an immense relief to Dick.

Dick supplemented his teaching salary by giving additional lectures and classes. A handbill survives (see figure 1) which advertised a series of lectures by T. Dick, beginning on 13 January 1820, for 'young persons of 15 years of age, and upwards, in the sciences of GEOGRAPHY and ASTRONOMY, on a popular plan'.<sup>59</sup> This handbill gives us some idea of the tools of instruction he used during his lectures. It mentions 'Celestial and Terrestrial Globes, the Orrery, the Equatorial, and other appropriate instruments'. This description highlights the key role instruments played in education and in promoting lectures. Every private teacher of astronomy, Dick wrote, required such instruments, for they enabled instructors to 'make a deeper and more convincing impression on the mind of a tyro, than mere diagrams, or verbal explanations'.<sup>60</sup> Dick practised what he preached, purchasing, and in some cases constructing, his own astronomical instruments.<sup>61</sup> He also collected antique astronomical instruments and owned a magic lantern which he used during his lectures to show astronomical diagrams.

Seeking new ways to enhance his reputation and salary, Dick began

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probably taught a similar number of students per session during his tenure.

<sup>59</sup> 'Geography & Astronomy', Dundee District Libraries, Lamb Collection, dated 1 Jan. 1820. See also DCA GD/54/9/4 for a rat-chewed notice (c. 1822) by T. Dick for classes on arithmetic and practical mathematics.

<sup>60</sup> 'Observations on the Celestial Bodies, made in the day-time; particularly on the Planet Venus, with some new Deductions in relation to that Planet', *A Journal of Natural Philosophy, Chemistry, and the Arts* [Nicholson's], 36 (Oct. 1813), 109-28: 123.

<sup>61</sup> Dick's will mentions his orrery (which he specifies was of his own construction) and equatorial, along with two telescopes and other instruments. Scottish Record Office, SC45 (Dundee), 25 Aug. 1857. My thanks to David Gavine for this reference.

Figure 1

# Geography & Astronomy.

ON Monday the 13th current Mr T. Dick, proposes opening a Class, at his Lodgings, head of South Street, for the instruction of young persons of 15 years of age, and upwards, in the sciences of GEOGRAPHY and ASTRONOMY, on a popular plan.

The discussions on these subjects will be illustrated by the Celestial and Terrestrial Globes, the Orrery, the Equatorial, and other appropriate instruments; and will occasionally be interspersed with sketches and experiments on several philosophical topics connected with these sciences.

Hours of attendance from Seven to half past Eight, in the evening, during four days of the week.

*Stewart's Free School, head of the South Street, Perth, 1st Jan. 1822*

R. Morison, Printer.

experiments into telescope design and invented what he termed an 'aërial reflector', of which he was inordinately proud. He published accounts of this in the *Edinburgh New Philosophical Journal* in July 1826, the *London Mechanics' Magazine* for August 1826, and the *London Encyclopaedia*, and brief instructions for its construction crop up later in many of his books.<sup>62</sup> He had high hopes for his design, patenting it and excluding from published accounts 'more minute directions' which he claimed were crucial for its replication. For Dick its virtues were many: it was extremely simple, comparatively inexpensive, convenient for viewing celestial objects at high altitude, and shorter, brighter and more stable than equivalent Gregorian reflectors. '[S]o much am I convinced of their utility', he declared, 'that I have dismantled every other Gregorian telescope I had in my possession, and fitted it up in the form now described'.<sup>63</sup> He exhibited several aërial reflectors at Calton Hill Observatory, Edinburgh, where he was pleased to report that Professors William Wallace and John Leslie 'compared their performance with that of an excellent Gregorian'.<sup>64</sup> Yet, despite this praise and his repeated efforts to publicize his design, it never caught on.<sup>65</sup>

Having displayed skill and originality as an astronomical observer and

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<sup>62</sup>Dick, 'Description of a New Reflecting Telescope, Denominated the Aërial Reflector', *Edinburgh New Philosophical Journal*, 1 (July 1826), 41-51; *London Encyclopaedia*, article 'Telescope'; *Christian Philosopher* (1846), Appendix X; *Improvement of Society*, pp. 134-36 (with diagram); *Practical Astronomer*, pp. 311-25.

<sup>63</sup>*Ibid.* ['Description of a New Reflecting Telescope'], 51.

<sup>64</sup>Dick, *Practical Astronomer*, p. 325.

<sup>65</sup>Perhaps this was due to design flaws. As David Gavine notes, Dick's design required an observer to sit 'with his back to the sky field' while peering down an eyepiece 'mounted on an arm fixed to a short mahogany tube containing a concave mirror...'. He concludes that these telescopes 'must have prone to astigmatism and very difficult to align on faint objects'. See D. Gavine, 'Thomas Dick (1774-1857) and the Plurality of Worlds', 6. At least two of Dick's correspondents tried to build aërial reflectors, with indifferent results. See DCA GD/x246/3, GD/x246/4.

instrument maker, Dick sought a reputation as a Christian astronomer by calling in 1818 for the reform of star charts and globes. Constellations named after pagan gods and heroes, he pontificated, were 'completely repugnant to the noble elevation of modern astronomical science'. '[N]ow that the astronomer views the stars as so many suns and systems of worlds', he continued, 'the association of such august objects, with representations so silly and whimsical as the mythological figures depicted on our globes and planispheres, produces not only a ludicrous effect... but... tends to lessen the idea of sublimity, which naturally strikes the mind on the contemplation of such a stupendous scene'. To persuade reluctant scientists to adopt a new system, he argued that, just as with the new nomenclature in chemistry, new sky maps would prove simpler, more precise, and easier to learn than the older system of pagan constellations.<sup>66</sup> He would later applaud the British Association for the Advancement of Science for its efforts to reform star charts.<sup>67</sup>

Meanwhile, Dick continued to construct a literary identity for himself. It is interesting that he wrote for the *London Monthly Magazine*, a miscellany journal intended for serious readers which was the 'first organ of a newly self-conscious English middle-class reading audience'.<sup>68</sup> His queries about, and brief articles on, astronomy appeared in respectable scientific journals such as the *Annals of Philosophy*<sup>69</sup> and the *Edinburgh Philosophical Journal*.

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<sup>66</sup> 'Mr Dick on the Names and Figures of the Constellations', *Monthly Magazine*, 46 (1 Oct. 1818), 201-03; (1 Jan. 1819), 500-02.

<sup>67</sup> Dick, *Sidereal Heavens*, pp. 42-49. These efforts came in 1838-39.

<sup>68</sup> J.P. Klancher, *The Making of English Reading Audiences, 1790-1832* (Madison, 1987), pp. 39-41. Its circulation stood at 5000 in 1797 and 4000 in 1822, according to R.D. Altick, *English Common Reader*, p. 392.

<sup>69</sup> In Apr. 1815, Dick wrote an open letter to the editor, asking whether stars were visible in day-time from a deep pit and why increases in telescopic magnifying power made stars more visible in day-time. He also reported results from his own experiments. See 'Queries respecting the visibility of

He also penned articles for *The Independent*, a London-based literary and political review; *The Edinburgh Christian Instructor*, the mouthpiece of Evangelicals within the Established Church; and *The Recorder*. His literary efforts, along with his lectures, classes, day-time observations, and aërial reflectors, all served to legitimate his status as a Christian philosopher, one who was capable of doing original work which was worthy of being noticed and applauded both by esteemed natural philosophers and by evangelical Christian audiences.

### 2.3 Author and Christian Philosopher: Dick's Last Thirty-three Years

It was the phenomenal success of his first book, *The Christian Philosopher* (1823), which in essence consummated his self-modelling process. His choice of title indicated his debt to the past: this had been the title conferred upon Robert Boyle in a eulogy by the Rev. Gilbert Burnet.<sup>70</sup> Dick himself admired Boyle, whom he described as 'that excellent philosopher and divine' whose philosophical pursuits were all 'consecrated to the service of Religion'.<sup>71</sup> For Dick it was 'Christian philosophers' like Boyle, Ray, Derham, and Nieuwentyt<sup>72</sup> who demonstrated the proper way to study nature. However, it appeared to Dick that many of his contemporaries, instead of emulating these pious and humble writers, wrote about God 'with the same ease

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stars in the day-time', *Annals of Philosophy*, 5 (1815), 466-68.

<sup>70</sup> *Sermon Preached at the Funeral of the Honourable Robert Boyle*, January 7, 1691/2, quoted in S. Shapin, "'A Scholar and a Gentleman'", 299. There exists today a Society of Christian Philosophers which publishes the journal *Faith and Philosophy*. Dick would have thrived in this society.

<sup>71</sup> Dick, *Christian Philosopher*, I, 59; II, 307.

<sup>72</sup> A Dutchman who wrote *The Religious Philosopher: Or, the Right Use of Contemplating the Works of the Creator* (London, 1721). William Paley was accused of plagiarizing this work in his *Natural Theology* (1802).

and indifference as a mathematician would talk about the properties of a triangle, or a philosopher about the effects of a mechanical engine....'<sup>73</sup> Unlike, say, William Whewell and other 'Counts of science' who formed the British Association in 1830,<sup>74</sup> Dick drew his inspiration from Boyle and other Christian philosophers who had advocated a committed study of nature as a religious activity of great moral efficacy inseparable from sincere piety and devout worship of God.

If Dick's choice of book titles was a tactic by which he sought to gain a reputation for himself, it was eminently successful, as his contemporaries did come to praise him as a 'Christian philosopher'.<sup>75</sup> For one such as Dick, a higher expression of approbation can scarcely be imagined. As defined by the eminent geologist and minister Edward Hitchcock, a Christian philosopher

calmly surveys the phenomena of nature, to learn from thence the great plan of the universe as it lay originally in the divine mind. Nor does he stop when he has found out the... laws of nature, but rises to those higher principles by which the moral relations of man to his Maker are disclosed. Hence he receives with gratitude and joy those richer disclosures of truth which revelation brings. To its authority he bows reverently and rejoicingly, and counts it the best use he can make of science to render it tributary to revelation, and to the cultivation of his own piety.<sup>76</sup>

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<sup>73</sup>Dick, *Christian Philosopher*, I, 60.

<sup>74</sup>I owe this description to Jack Morrell, who suggested that the founders of the British Association might better be described as 'counts' rather than as 'gentlemen' of science because of their intense desire to exercise complete mastery over their various scientific fiefs.

<sup>75</sup>Interestingly, in his attacks against the British Association and other so-called 'pretenders', the eccentric inventor William Martin (1772-1851) adopted the 'Christian philosopher' as his *nom de guerre*. He tended to support a literal interpretation of the Bible, arrived at through his own self-styled 'Martinian' philosophy. Typical of one of his numerous pamphlets was *The Defeat of all scientific babblers without genius over all the world*, by the Christian philosopher (Newcastle, 1838). On Martin see *DNB*, v. XII, 1186-87; and A.D. Orange, 'The Idols of the Theatre: The British Association and its Early Critics', *Annals of Science*, 32 (1975), 277-94: 289 n. 74.

<sup>76</sup>E. Hitchcock, *Religious Truth, Illustrated from Science*, in *Addresses and Sermons on Special Occasions* (Boston, 1857), pp. 95-96.

From this passage, one gains a deeper appreciation for the compliment which the American author Charles D. Cleveland bestowed on Dick when he wrote that

No author of the nineteenth century has a higher claim upon the respect and gratitude of the world than the venerable Christian philosopher, Dr. Thomas Dick ....[for] his efforts to demonstrate the compatibility and harmony of all true philosophy with the Christian plan of redemption and the truth of the life to come, and from the success with which he has explained the philosophy of religion.<sup>77</sup>

Once he became a Christian philosopher, Dick was able to confer this cachet on others. For example, in his preface to M.S. De Vere's *Stray Leaves from the Book of Nature*, Dick claimed that De Vere wrote 'in the spirit of a true Christian philosopher' because he took 'every opportunity of adverting to the evidences of Divine beneficence and wisdom which appear in the works of the Creator'.<sup>78</sup> More importantly, by becoming a Christian philosopher, Dick regained the pulpit. Invited as early as January 1828 to give a sermon in church,<sup>79</sup> in the first six months of 1840 he received three letters which survive today requesting him to preach.<sup>80</sup>

Unwisely selling the copyright to *Christian Philosopher* to William Collins, his publisher in Glasgow, Dick retired from teaching in 1827 and settled down to writing works on theology, education, social reform and astronomy for a general audience. On a barren site on Fort Hill in Broughty Ferry, a small fishing village near Dundee, he had a house built, which he

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<sup>77</sup>C.D. Cleveland, *English Literature of the Nineteenth Century* (Philadelphia, 1863), p. 576.

<sup>78</sup>M.S. De Vere, *Stray Leaves from the Book of Nature* (London, 1856), p. vi.

<sup>79</sup>G. Young to Dick, 30 Jan. 1828, DCA GD/x33/1/6.

<sup>80</sup>On 18 Jan. and 13 May a Mr. Jonathan Watson wrote from Cupar, and on 25 Apr. the Rev. William Lowe wrote from Forfar, requesting Dick to preach. During these same few months, requests for lectures came from the Rev. Adam Blair (on education) and from Alex Boyle of the Total Abstinence Society. These letters are held in a private collection, location unknown.

equipped with a rooftop observatory.<sup>81</sup> Showing considerable perseverance and adherence to the Presbyterian work ethic as well as enviable stamina for a man in his early fifties with a supposedly sensitive constitution, he reputedly wheeled eight thousand wheelbarrow loads of dirt up his steep hill to create a garden here. This Sisyphean tale is repeated so often in biographies of Dick that one wonders if it had deeper meanings. Perhaps this was a topos for manliness, or perhaps in cultivating his garden, Dick felt he was returning one small patch of the earth to its prelapsarian perfection (W.B. Sprague recalled that the grounds surrounding Dick's house 'were laid out and ornamented with exquisite taste').<sup>82</sup> But, from Elihu Burritt's account, this garden also clearly served as an important source of food for Dick and his family.

No doubt Dick's fellow villagers thought him somewhat eccentric. They were initially baffled by his decision to build his house on such an isolated, barren and windy spot. In the end, however, they seem to have concluded that he wanted to be alone with the stars. Yet progress eventually caught up with Dick. In 1838 a railway station opened in Broughty Ferry as part of the Dundee/Arbroath line, helping to make the Ferry a fashionable resort for bathing. By the year of his death, Dick had to share with 'several splendid mansions' his commanding position on Fort Hill overlooking the Firth of Tay.<sup>83</sup>

Dick's next two works, *The Philosophy of Religion* (1826) and *The Philosophy of a Future State* (1828), the latter dedicated to Thomas Chalmers, were more sharply focused on theological subjects. On the basis of his first

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<sup>81</sup>Described by D. Gavine, 'Thomas Dick, LL.D., 1774-1857', 346.

<sup>82</sup>W.B. Sprague, *Visits to European Celebrities*, p. 291.

<sup>83</sup>C.C. Maxwell, *A Historical And Descriptive Guide to Dundee* (Dundee, 1858), p. 110.



three books, Union College in Schenectady, New York, which in the 1830s rivalled Harvard and Yale, awarded Dick a doctorate of laws on 8 August 1832.<sup>84</sup> His later works included *On the Improvement of Society by the Diffusion of Knowledge* (1833), *The Mental Illumination and Moral Improvement of Mankind* (1835), and *Christian Beneficence contrasted with Covetousness* (1836).<sup>85</sup> It was no accident that these three works, directed towards educational, social and moral reform, appeared during the socially and politically tumultuous 1830s. They were followed by *Celestial Scenery* (1837), *The Sidereal Heavens* (1840), *The Practical Astronomer* (completed in 1842, but not published until 1845 due to the poor state of the bookselling trade), *The Solar System* (1846), *The Atmosphere and Atmospheric Phenomena* (1848), and *The Telescope and Microscope* (1851). The latter three were written for and published by the Religious Tract Society. Nearly all of these sold well, but Dick unwisely sold, for comparatively small sums, the copyrights to all but one of his books to his publishers.<sup>86</sup>

It may well prove a useful digression here to look at the frontispieces which Dick chose for his books. An engraving of Isaac Newton welcomed readers of *The Christian Philosopher*, placing Dick firmly within the Newtonian tradition. Joseph Butler (1692-1752) peered out of *The Philosophy of a Future State*. Butler's analogical reasoning and arguments from human conscience, which he had directed against deists, were admired by many leading theologians and natural philosophers in Victorian Britain and antebellum America. Two

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<sup>84</sup>For further details on his doctorate, see chapter seven.

<sup>85</sup>He wrote this last book in competition for a prize of 100 guineas offered by Dr. John T. Conquest of London for a book written on the evils of covetousness. But he failed to finish the book in time for it to be judged. John Harris, D.D., won the prize with his *Mammon: or Covetousness the Sin of the Christian Church*, which went on to sell nearly thirty thousand copies. See the entries for Conquest and Harris in the *DNB*, IV, 955-56; IX, 15-16.

<sup>86</sup>Dick's dealings with his publishers are discussed in chapter six, section two.

Bible-carrying missionaries greeting islanders on some distant shore--with the Scriptural injunction to 'Go, and teach all nations' (Mat. 28:19) at the bottom of the page--confronted the reader of *Mental Illumination*. This frontispiece illustrated the Christian mission of propagating knowledge which Dick saw himself fulfilling.

Dick himself gazed forth from *Sidereal Heavens* (see figure 2), a most interesting frontispiece indeed. This stipple engraving by Henry Cook first appeared in the *Evangelical Magazine* in December 1838. This in itself is noteworthy; each monthly issue of this magazine contained a frontispiece showing a leading evangelical, but the vast majority of those so honoured were ministers. Only the most prominent laymen, such as William Wilberforce, appeared. Dick's inclusion provided him with visual confirmation of the high stature he had acquired among evangelicals.<sup>87</sup> The engraving was based on a half-length portrait painting (about three feet in length, and now sadly lost) in Dick's possession.<sup>88</sup> Apparently sitting at a desk, quill pen in hand, dapper and clean-shaven, healthy and with clear eyes, not gaunt or ascetic in any way, here was an image becoming to a confident Christian philosopher. In the immediate background stands one of his aërial reflectors,<sup>89</sup> instantly recognizable to his dedicated readers. Orreries and globes jostle for position in the more distant background: these would all

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<sup>87</sup> It perhaps also served to promote sales of Dick's then most recent work, *Celestial Scenery* (1837). Its publisher was Thomas Ward, who also published the *Evangelical Magazine*.

<sup>88</sup> This engraving appeared in *Sidereal Heavens* in 1840 and *Celestial Scenery* in 1848. A slightly different version served as the frontispiece to Dick's complete *Works*, published by Applegate in Cincinnati in 1850. Details about this engraving and the painting from which it was taken were supplied by Dick in a letter to James Blackwood, 31 Mar. 1851, Bod. MS Eng Misc C334, f.147.

<sup>89</sup> Misidentified as 'electrical apparatus' in R. Burgess, *Portraits of Doctors & Scientists in the Wellcome Institute of the History of Medicine* (London, 1973), p. 98, entry number 807.



THOMAS DICK, L.R.S.

AUTHOR OF "THE CHRISTIAN PHILOSOPHER" &c. &c.

Engraved by H. Cook.

Engraving of Thomas Dick, after a Portrait, Showing Aërial Reflector and other Astronomical Instruments

have been of Dick's construction. Finally, an engraving of Dick's observatory caught the eye of readers of *The Practical Astronomer*. Here it might be expected that Dick wished his readers to conclude that, because he had his own observatory, he had the experience one needed to write a practical handbook on astronomy.

Dick never commented on the rhetorical strategies or semiotics of his frontispieces, but this does not mean that these and other images were of little importance to him. For example, in one instance he complained that a daguerreotype of him was 'somewhat ghastly in its aspect', making him 'appear older than I really am'. He favoured instead an engraved portrait which had been published in the *Portrait Gallery of Hogg's Weekly Instructor*, and he wrote that before a new daguerreotype of him was published, he wanted to inspect it.<sup>90</sup> The engraved portrait which he favoured is shown in figure 3. The engraver was Francis Croll (1826?-54), a skilled draughtsman well-known for portraiture who also did portraits of David Brewster, Michael Faraday, Hugh Miller, and Mary Somerville for Hogg's. Notice that figure 3 is an autographed engraving. Such images were often sent to autograph seekers, and a few letters survive to Dick asking him for his autograph.

A close analysis of Dick's career from 1824 to 1857 informs the body of this thesis, so only a few significant points will be mentioned here. Now a noted author, Dick helped to advance the cause of the Watt Institute, Dundee's mechanics' institute. During its first session of mutual instruction from 1829 to 1830, he gave four lectures: three on 'The Properties of the Atmosphere' and one on 'The Diffusion of Knowledge'. On the basis of these, he was elected an honorary life member in 1830, and made a director from 1830

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<sup>90</sup>NLS Acc 5562, 47-8, 3 Apr. 1850.

Figure 3



*Yours very truly*  
*Thomas Dick*

Portrait Gallery of Hogg's Instructor.

Engraving of Thomas Dick for the Portrait Gallery of Hogg's Weekly Instructor

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to 1831.<sup>91</sup> His son Thomas Jr. (1811-66), who served as English Master at Tay Square Seminary from 1831 until his retirement after a heavy cold in 1859, served on the directorate of the Watt Institution from 1837 to its demise in 1849 (with the exception of two sessions). And Dick's son-in-law, Andrew McNab, had a summer school in geography and astronomy for ladies at Tay Square Seminary in 1832. For Dick, education was a family concern.

The importance of education to Dick's family life must only have been reinforced when he married Euphemia Young, daughter of the Rev. Dr. John Young of Hawick, in July 1830 after the death of his first wife. Euphemia was the widow of Alexander Davidson, an itinerant lecturer on science who had died in 1826. She was described as being indispensable to her first husband's lectures, in part because he was blind but also because she was skilled at performing experiments.<sup>92</sup> She shared Dick's interest in science, and upon her death in 1840 she was described in obituaries as 'Well known for her acquisitions in experimental philosophy and chemistry, and for the elegance and dexterity with which she conducted experiments on these subjects'.<sup>93</sup> Unfortunately, I have found virtually no evidence by which I could determine her contribution to Dick's later writings.<sup>94</sup>

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<sup>91</sup>J.V. Smith, *The Watt Institution, Dundee 1844-49* (The Abertay Historical Society, Publication 19, 1978).

<sup>92</sup>J. Wilson, *Biography of the Blind*, 4th edn. (Birmingham, 1838), pp. 136-43. Like Dick, Davidson supported natural theology. Wilson reports that his lectures were characterized by 'the sublime and magnificent conceptions they conveyed of the wisdom and beneficence which may be traced in the arrangements of nature' (p. 139). My thanks to David Gavine for this reference.

<sup>93</sup>R. Small, *United Presbyterian Church 1733-1900*, II, 671-72.

<sup>94</sup>Euphemia must have had a hand in a detailed account of A. Davidson's experiences in Ireland in 1814 or 1815, reported in Appendix VI to *Improvement of Society*, pp. 507-08, and in an anecdote of his experiences with a customs house in *Mental Illumination*, p. 488. But these are the only passages I have been able to identify in Dick's writings where Euphemia's hand can be safely assumed. W.B. Sprague described Euphemia as being 'much engaged in philosophical pursuits', but his claim that she looked 'not unlike Maria

Euphemia's accomplishments, if not her direct input, may have influenced her husband to issue strong statements in favour of women's education. Deserving women should be able to earn academic degrees, even doctorates, Dick observed. Merit, not gender, was what counted. In bringing up children, moreover, women largely determined 'the moral principles and characters of mankind'. Naturally, better educated women would display more discretion and intelligence in moulding the minds of youth. He sensibly added that, since women as well as men were destined for immortality, they too needed time to study the natural world to prepare for their explorations of God's universe in the afterlife.<sup>95</sup>

Dick's statements in favour of women's education prompted calls to him to aid in the founding of women's colleges. In one instance he was offered a position as schoolmaster at £50 per year in Hackney, London. He was to teach young women the science of education, including mental and moral philosophy and logic; English language and literature; history, geography, astronomy and natural science; and mathematics. This offer, which doubtless reminded him of the low pay schoolmasters earned, he must have declined.<sup>96</sup>

Besides the books and tracts already mentioned, Dick continued to pursue other literary efforts. From 1835 to 1836 he served as editor for the first three volumes of the *Educational Magazine and Journal of Christian Philanthropy and of Public Utility*. This periodical, published in London, was written chiefly for schoolteachers and educational reformers. It promoted Dick's thesis that education was essential to the improvement of society, and

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Edgeworth', though no doubt intended as high praise, is frustratingly vague! Sprague, *Visits to European Celebrities*, p. 291.

<sup>95</sup>Dick, *Mental Illumination*, pp. 301-03.

<sup>96</sup>Prothesia S. Goss to Dick, 31 Oct. 1837, NLS MS 9658 ff 28-9; see also f76. I discuss women's involvement in science, particularly astronomy, in chapter eight, section four.

that, when science was taught, it had to be joined inseparably to religion. From 1836 to 1840 Dick wrote twenty-four articles for the *Dundee, Perth and Cupar Advertiser* describing celestial phenomena and monthly aspects of the night sky.<sup>97</sup> These may represent the first sustained series of newspaper articles on astronomy written for the public.<sup>98</sup> To publicize his *Celestial Scenery* and gather intelligence for his *Practical Astronomer*, he visited in 1837 London, Boulogne, Paris (touring the Royal Observatory and various colleges), and Versailles, returning through Cambridge, where he toured the university observatory.

Placing Dick within an astronomical milieu is a straightforward exercise. He was part of a small, informal network of amateur astronomers which included the Rev. Thomas William Webb (1807-85), Rev. Benjamin W.S. Vallack,<sup>99</sup> the London optician William Wray (1829-85, FRAS 1862), and John Drew (1809-57, FRAS 1846). Dick had much in common with these men. Webb was precentor and minor canon of Gloucester cathedral from 1844 to 1849 and later vicar of the church of Tretire, Herefordshire, from 1854 to 1862. Like Dick, he wrote a manual on astronomy for beginners in which he referred to the unspeakable greatness and glory of God as revealed in the heavens.<sup>100</sup> Drew, like Dick, had been a schoolmaster, teaching in Southampton from 1826 to 1842. He published, as did Dick, an introductory manual on astronomy in 1845. Drew shared with Dick a belief in the plurality of worlds, stating 'all

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<sup>97</sup> James Duncan of the *Perth Chronicle* was impressed, requesting that Dick write similar articles for his newspaper, though all he could offer in return was a subscription to the *Chronicle*. DCA GD/X82/1, 6 Jan. 1837.

<sup>98</sup> D. Gavine, 'Thomas Dick (1774-1857) and the Plurality of Worlds', 4.

<sup>99</sup> D.W. Dewhirst, 'The Correspondence of the Rev. B.W.S. Vallack', *Quarterly Journal of the Royal Astronomical Society*, 23 (1982), 552-55. Vallack was vicar of St Budeaux, near Plymouth, from 1832 to 1875.

<sup>100</sup> T.W. Webb, *Celestial Objects for Common Telescopes* (London, 1859), p. 16. For his letters to Dick see NLS MS ff 45-6 and Acc 6908(pt).



the planetary bodies are the abodes of intelligent beings'. And he cited and commended Dick's *Sidereal Heavens*.<sup>101</sup>

There is no evidence that Dick corresponded with George Airy or any of the more prominent astronomers of his day.<sup>102</sup> However, he did correspond actively with many mechanics, shoemakers and other enthusiasts who queried him about telescopes, celestial atlases and globes, optics, and other branches of science. When not answering these queries or otherwise employed, he continued making astronomical observations in the daytime, publishing his results in the *Edinburgh New Philosophical Journal* in 1844.<sup>103</sup> With respect to this article, one might note that he concluded that there was something inherent in the surface of Venus which made it reflect 'the solar rays with peculiar brilliancy, more than that of any other planet'.<sup>104</sup> He was not far off the mark, for as we know today it is the cloud cover on Venus which reflects the sun's rays with particular brilliance.

Dick preferred to lead a contemplative life of observing the heavens from his isolated hill-top home rather than a life of action in the hurly-burly of the city. Like many evangelicals, he mostly steered clear of politics. He appears to have opposed the Corn Laws because he felt workers unfairly bore the burden of higher bread prices. To the best of my knowledge, he did not express an opinion on the struggle between Moderates and Evangelicals within Scotland's Established Church or on the Disruption of 1843. As a 'New Licht' Seceder, he did strongly oppose any formal connection

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<sup>101</sup> J. Drew, *Manual of Astronomy: A Popular Treatise on Descriptive, Physical, and Practical Astronomy* (London, 1845), pp. 219, 233.

<sup>102</sup> I wish to thank A.J. Perkins, Royal Greenwich Observatory Archivist, for checking the archives for me.

<sup>103</sup> 'Observations on the Planet Venus at the Time of its Superior Conjunction', *Edinburgh New Philosophical Journal*, 36 (1844), 164-67.

<sup>104</sup> Dick, *Christian Philosopher*, I, 272, note.

between Church and State. He was, however, far more dedicated to the diffusion of knowledge and the cultivation of an irenic Protestantism--tinged with evangelical and millennial concerns and based on Christ's two great commandments--which would transcend sectarian disputes and unify traditional denominations. In later chapters, I attempt to locate Dick within the educational and religious milieu of his day. Suffice to say here that, for a Seceder, he was remarkably broadminded and tolerant. He particularly admired Quakers or the Society of Friends, writing that 'They are, on the whole the most pleasing and practical Christians with whom I am acquainted, although the Evangelical Alliance has thought proper to withhold them from its Associations'.<sup>105</sup> He even had a kind word or two for Catholics.<sup>106</sup>

In September 1841 Dick married Elizabeth Glegg, his third wife. Family tragedy struck in January 1843 when his daughter Margaret and her husband Andrew McNab died within thirteen days of each other, leaving Dick and his wife with five young orphans (the oldest was eleven, the youngest two) to bring up. Since Dick was already supporting an infirm sister, this latest burden seriously strained his finances. He was forced to sell his best telescope,<sup>107</sup> his only steady income being an annuity of L20 from Stewart's Free Trades' School and L12 or L13 from letting the 'principal' part of his house. (He wrote that since c.1834, he had been forced to live chiefly in its 'attic' rooms, with exception of a single room for making observations.) He lamented in 1846 that aiding his relatives over the last ten to twelve years had cost him about L200, 'no part of which can now ever be restored'.<sup>108</sup>

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<sup>105</sup> Dick to Sprague, 11 Oct. 1854, DCA GD/X33/2/6.

<sup>106</sup> Dick, *Improvement of Society*, p. 13.

<sup>107</sup> '[A]n excellent Achromatic, 6 feet 8 inches focal distance, and 4 inches diameter', according to Dick. See Dick to Vallack, 12 May 1846, RAS Add MSS 129/9.

<sup>108</sup> 'Statement in Relation to T.D.', 1846, DCA GD/X33/2/3.

In December he applied for a government pension but was turned down. This decision precipitated a harsh philippic by the poet Peter Livingston:

Here is a man, over whose eloquent pages millions in this country, in Europe, and America, have hung with rapture and pondered with profit. Here is the man, who has done more than any other man we know, to popularise science among the people.

The man who has written the "Christian Philosopher," in which he speaks of the works of God; and shows that in wisdom he hath made them all,--the man who has written the philosophy of a future state, in which he has built up our hope; confirmed our faith in another and better world,--the man who has written the "Sidereal Heavens," in which he holds communion with the stars and talks to the sun as to a play-fellow,--the man who has done all this, and much more than this; he who has given the world so much bread, has received, in return for his gift, a stone.<sup>109</sup>

Because he had received only a stone, in 1847 he had to send, 'in opposition to his own feelings and affections, and to those of Mrs Dick', two of the orphaned girls to John Watson's Institution in Edinburgh. Here they were maintained and educated at no charge. He could also no longer afford to keep a servant. 1849 saw him enfeebled by a severe illness, which necessitated a radical surgical operation on his chest, from which a large tumour was extracted. He never fully recovered from this. Fortunately, the next year a group of local gentlemen subscribed to a fund which provided him an additional L20 to L30 per year.<sup>110</sup> Meanwhile, his American admirers organized three relief efforts (detailed in chapter seven) which collected a further L300 for Dick.

Given his illness and straitened means, his supporters urged him to reapply for a government pension. In 1850 he did so. Once again, Lord John

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<sup>109</sup>P. Livingston, 'Letter on Dr. Dick, the Christian Philosopher' for the *Cardiff and Merthyr Guardian*, reprinted in *Poems and Songs; with lectures on the genius & works of Burns, and the Rev. George Gilfillan; and letters on Dr Dick, the Christian philosopher, and Sir John Franklin and the Arctic regions* (Dundee, 1867), pp. 46-47.

<sup>110</sup>This subscription eventually collected L223 13s. 2d., of which L139 9s. 6d. was collected in Dundee and neighbourhood, L22 2s. 6d. in Brechin, and L63 1s. 3d. in Edinburgh. About L70 remained when Dick died. From W. Norrie, *Dundee Celebrities*, pp. 167-72.

Russell, first lord of the treasury, turned him down. One might have thought that Russell, who took an interest in education and who had served as Vice Chairman of the Society for the Diffusion of Useful Knowledge, would have taken a special interest in Dick's application. Dick's supporters were outraged. Dick himself drew some comfort from supporters like the Scotsman John Campbell, editor of the *British Banner*, who declared that

The case of this most deserving scholar and author has once again been pressed on the Premier [Russell] ... when that Premier replied, he was sorry for the circumstances of the excellent author, but regretted that nothing could be done for him! In this case the deed will not command the sanction of public opinion. It is another proof that to benefit the nation is neither the short nor the sure way to the favor of the sovereign.<sup>111</sup>

Such paeans of praise may not have won Dick any money, but they do illustrate the high regard in which he was held in some quarters.

Dick proved successful, however, in his application to the General Committee of the Royal Literary Fund. From this he received L50 in February 1850 for his 'Eminently useful labours in the cause of science & religion' and L30 in April 1851 and probably similar sums in 1852 and 1853, but he refused to reapply in 1854 for 'particular reasons which prevent me from soliciting assistance from this quarter at present'.<sup>112</sup>

Persisting with his efforts to gain state support, Dick thought someone must have omitted a zero when he received a letter in March 1855 stating he had received a government pension for L10 per year from the Queen's Charity Roll. But in July he secured a Civil List pension for L50 per year which superseded this niggardly amount. Though Dick himself died within two years, Elizabeth continued to receive his pension until her death in 1874. Compared

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<sup>111</sup>Letter dated 3 Apr. 1850, DCA Acc 5562, 47-48. See also NLS MS 11000 ff 47-8, 3 Apr. 1850. Dick states the *Banner's* editorial appeared on 20 Mar. 1850.

<sup>112</sup>DCA GD/x264/12, NLS 14303 ff 111 R+V, dated 18 Aug. 1854. See also DCA GD/x33/2/5 for Dick's statement to the Royal Literary Fund for 1853.

with the L300 annual pensions which Michael Faraday and Mary Somerville were awarded in 1835 and 1837, respectively, or even the L100 annual pension which Mrs Bessy Moore, wife of the poet Thomas Moore, received, Dick's pension was relatively modest. Yet it was respectable; in 1849, the noted electrical experimenter and lecturer William Sturgeon had also been awarded a L50 annual pension.<sup>113</sup>

Through his last years and declining health Dick continued writing and lecturing on astronomical matters. In 1848 he wrote articles on the transit of Mercury and a spectacular aurora borealis; the latter appeared in the *Montrose Review*, perhaps in connection with a series of lectures he gave that year at Craigs' Bleachfield Works, near Montrose. Dick inspired a worker present at these lectures, John Robertson of Coupar Angus, to pursue astronomy. Robertson recalled that 'Dr. Dick was an excellent lecturer, and I listened to him with attention'. Later, at Inverury in 1854 and after, 'I became a member of a reading-room club, and read all the works of Dr. Dick that the library contained: his "Treatise on the Solar System", his "Practical Astronomer", and other works'. Robertson was later immortalized by Samuel Smiles as a railway porter who moonlighted as a dedicated amateur astronomer.<sup>114</sup> Closer to home, Dick lectured in Dundee in 1851. A handbill survives (see figure 4) listing three lectures on three nights in November. He charged sixpence for all three lectures, or threepence for one. These fees were quite low and were well within the means of workers with a

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<sup>113</sup>On Sturgeon see I. Morus, 'Different Experimental Lives: Michael Faraday and William Sturgeon', *History of Science*, 30 (1992), 1-28; and R. Kargon, *Science in Victorian Manchester: Enterprise and Expertise* (Baltimore, 1977), pp. 39-41.

<sup>114</sup>S. Smiles, *Men of Invention and Industry* (London, 1884), p. 329.

keen desire to learn astronomy.<sup>115</sup>

The year 1850 found Dick in London, where he heard Charles Grandison Finney, the famous American revivalist preacher, give a sermon on 18 August. That summer he also attended the Peace Congress in Frankfurt am Main, where C.D. Cleveland reported that, 'though in body he appeared somewhat enfeebled from his advanced age, he showed a vigor of mind unimpaired, while his countenance was radiant with those benevolent affections and philanthropic feelings which have characterized him from his earliest years'.<sup>116</sup> Dick was back in London in October 1852, and perhaps with a measure of pride (after all, he was about to turn eighty) he wrote to his friend Sprague in 1854 that, in the last few years, he had visited 'Manchester, Birmingham, London, Brighton, The Isle of Wight, and other places. In these excursions, I have delivered lectures in different towns, frequently to crowded audiences, and sometimes preached and delivered addresses as opportunity occurred'.<sup>117</sup>

His remaining years saw him elected on 14 January 1853 to the Royal Astronomical Society, and next winter he managed to attend its meeting in London, dining at the annual Festival. But he was clearly in decline, writing in a less firm hand on 23 March 1855 that, 'Though somewhat feeble, [I] was able to fulfill an engagement in Montrose, in delivering a lecture to the Young mens Institution in that place'.<sup>118</sup> In the autumn he wrote that he had attended the yearly meeting of the British Association in Glasgow. Yet with a note of regret he admitted in this letter that he now had to enlist

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<sup>115</sup>By comparison, lectures on phrenology ranged from 1d to 10s 6d per lecture in the 1830s and 1840s, with an average price of perhaps one-to-two shillings. See R. Cooter, *Cultural Meaning of Popular Science*, pp. 352-53.

<sup>116</sup>C.D. Cleveland, *English Literature*, p. 576.

<sup>117</sup>Dick to W.B. Sprague, 11 Oct. 1854, DCA GD/x33/2/6.

<sup>118</sup>NLS MS 14303 ff 131 R+V.

# Dr. DICK'S LECTURES.

It has now been arranged that these Lectures, formerly advertised, will be delivered in the **NORTH FREE CHURCH**, on the Evenings of

**MONDAY, 3rd November, 1851.**

**TUESDAY, 4th Novr. „**

AND

**WEDNESDAY, 5th Novr. „**

*Commencing each Evening at 8 o'Clock precisely.*

## SYLLABUS OF LECTURES:

- 1st. On the Atmosphere,—its pressure and other properties.
- 2nd. A brief Sketch of the more remarkable Phenomena connected with the Solar system,—with a short account of the new discoveries which have been made during the last Six or Seven years.
- 3rd. A BRIEF SURVEY of the UNIVERSE.

The Lectures will be suitably illustrated, and be of a simple and popular nature.

Tickets are still on Sale at the different Shops &c. as formerly advertised, at **SIXPENCE for the whole Course.**

**Single Lecture THREE PENCE.**

**Kirriemuir, 24th October, 1851.**

G. MORRIS, Printer, High St. Kirriemuir.

GD/100. 54/5.

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others to prepare new editions of his works.<sup>119</sup>

A letter from the final year of his life, however, revealed that he had lost none of his Christian spirit. Answering a letter soliciting his advice on a proposal for a Scottish Literary Institute, Dick recommended that

all the public meetings should be opened with prayer to God for direction and guidance. This is not customary in Literary associations, but it cannot on this account be improper. We are too apt to consider secular and religious objects as essentially distinct; whereas they are only parts of one system, and every action we perform, if performed aright, and from proper motives, should be considered as a part of religion.... In regard to the Constitution of the Society I fear that the Annual subscription is too high, and may be the means of preventing Literary men of the lower ranks from connecting themselves with it. This I have considered an error in many other societies. The half of the proposed subscription might be sufficient, and I see no reason why a poor literary man should pay the same subscription as the Earl of Elgin, or his compeer.<sup>120</sup>

Thomas Dick died at home on the morning of 29 July 1857.<sup>121</sup> From a portion of the proceeds remaining from the public subscription on his behalf, his supporters erected in 1860 a fourteen-foot high obelisk of Peterhead granite in his memory. This impressive monument can be seen today near the entrance of St. Aidan's Parish Church in Broughty Ferry. Its still legible testament reads 'In Memory of Thomas Dick, L.L.D. Author of the Christian Philosopher &c. Born 1774. Died 1857'. When visiting this monument, one might wish to reflect on the following, deeply ironic, passage from Dick's *Philosophy of Religion*:

And how comes it to pass, if benevolence and justice be distinguishing features of our age and nation, that Authors, whose writings afford instruction and entertainment to a numerous public, are frequently suffered to pine away in anxiety and distress, and to remain in hopeless indigence, while publishers and booksellers are fattening on the fruit of their labours? Yet, while we leave them to remain in abject penury, during life,--no sooner have their spirits taken their flight into the world unknown, than subscriptions are set on foot, statues and mausoleums are erected, and anniversary dinners are appointed to

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<sup>119</sup>NLS MS 14303 ff 154 R+V, 8 Nov. 1855.

<sup>120</sup>Dick to Rev. Dr. Rogers, 19 Nov. 1856, NLS MS 14303 ff 313 R+V.

<sup>121</sup>For the notice of death see DCA GD/Mus 54/9/12.



celebrate their memories. Such displays of liberality might have been of essential benefit to the individuals, while they sojourned within the limits of this sublunary sphere; but they are altogether futile and superfluous in relation to separate spirits, which are now placed forever beyond the reach of such vain pageantry and posthumous honours.<sup>122</sup>

Not much in the way of pageantry or posthumous honours came to Dick after his death, yet he was not forgotten. In 1882 Ward and Lock's guide to the Eastern Highlands reminded its readers that on Fort Hill in Broughty Ferry 'The "Christian Philosopher", Dr. Thomas Dick, occupied a house on the slopes of the hill....'<sup>123</sup>

Today, one can take a self-guided walking tour of Broughty Ferry. Stop 4 on this walk is St. Aidan's church, where one is advised that 'In the graveyard is the tombstone of Dr Thomas Dick, a scientist and amateur astronomer who died in 1857'.<sup>124</sup> The monument testifies to his success in fashioning for himself a new identity after his defrocking. By displaying renewed religious fervour directed towards Christianizing science and disseminating it to the widest possible audience, he raised himself from the obscurity of a humble position of village schoolmaster to become one of the last of the 'Christian philosophers'.

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<sup>122</sup>Dick, *Philosophy of Religion*, p. 386.

<sup>123</sup>*The Eastern Highlands. Ward and Lock's Historical and Pictorial Guide to Perth, Dundee, Aberdeen, and the Neighbourhood* (London, 1882), p. 40.

<sup>124</sup>See the pamphlet entitled *Victorian Scotland. Broughty Ferry. A Victorian Suburb. A Guided Walk*. 1978.

### Chapter 3

#### Thomas Dick and Natural Theology in an Evangelical Context

The first duty of every rational creature is to love God supremely and affectionately, to render him the highest homage of our hearts, and to serve him throughout every period of our existence, in preference to every other object or being.

T. Dick, *Christian Beneficence contrasted with Covetousness* (1838).

This chapter seeks to situate Thomas Dick within the British tradition of natural theology and within evangelicalism. The first two sections provide a survey of natural theology as practised most notably by John Ray (1627-1705), William Derham (1657-1735), William Paley (1743-1805) and the eight authors of the *Bridgewater Treatises on the Power, Wisdom and Goodness of God* (1833-36). Comparisons are made between these authors' writings and those of Dick. It is suggested that Dick advocated a 'doxological' or God-praising theology of nature based upon knowledge of God derived from Scripture and elaborated by examining the natural world. He saw himself as reviving a tradition of sanctified study of nature for spiritual edification which he believed had been embodied by Christian philosophers like Robert Boyle, Ray and Derham but which he claimed had largely been abandoned in Britain by the 1820s. Dick sought to stave off what he saw as a secularizing trend among natural philosophers to play down the religious implications of their work. By setting his doxological theology of nature within an evangelical context, he further sought to win over those evangelicals who distrusted studies of the natural world or who even dismissed them as being dangerous to faith.

In sections three and four, it is argued that Dick sought to redefine the practice of Christianity by defining studies of the natural world as divine pursuits, a form of worship which was essential to Christian piety both in this life and in the hereafter. In part, Dick was seeking to raise the status of science and its practitioners within the evangelical milieu in which

he moved. His goal, in essence, was to make people who had acquired expertise in God's revelations in nature, such as natural philosophers or schoolmasters, the social and spiritual equals of the most erudite and devout ministers. Yet he also argued that science had essential religious functions, such as its ability to aid in the physical reform of the earth in preparation for the millennium. Most important of all, Dick believed that, through a pursuit of the 'facts' as contained in God's Word and Works, he had uncovered the uncontentious 'basics' of Christian theology and developed a moral philosophy, based upon Christ's two great commandments, which all Christians would find compelling. Evangelical responses to Dick's works, detailed in section four, revealed a complex debate within evangelical circles concerning the nature and uses of natural knowledge. While many evangelicals applauded Dick's doxological theology of nature, even holding him up as an exemplar for the proper approach that one should adopt to science, other evangelicals opposed his call for more exalted roles to be granted to natural knowledge of God within evangelical Christian culture.

### 3.1 Natural Theology in Britain from Boyle to Paley

Though their roots lay deep in Christianity's past,<sup>1</sup> God-centred studies of nature experienced a burst of growth in the religiously fertile and politically unstable soil of England in the 1640s and 1650s. Proponents of such studies preached that knowledge of God was to be found both in His Word

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<sup>1</sup>D.C. Lindberg, 'Science and the Early Church', in Lindberg and Numbers, eds., *God & Nature*, pp. 19-48; F. Oakley, 'Christian Theology and the Newtonian Science: The Rise of the Concept of the Laws of Nature', *Church History*, 30 (1961), 433-57; N.C. Gillespie, 'Natural History, Natural Theology and Social Order: John Ray and the "Newtonian Ideology"', *Journal of the History of Biology*, 20 (1987), 1-49: 6-15. That the notion of science and religion as distinct entities may have roots in ancient Greece is briefly examined by S. Mandelbrote, 'Essay Review: The Relationships of Science and Religion', *Annals of Science*, 50 (1993), 373-81, esp. 380.

and Works. Contradictions between the two Books of Scripture and Nature were considered impossible, for one form of sacred truth could not contradict another. Natural philosophers largely agreed that it was the *sine qua non* of their pursuit 'to look at nature and the world as created by God' thereby glorifying Him and attaining a deeper understanding of His attributes and His relationship to the physical universe.<sup>2</sup>

By stressing harmony between Scripture and nature, natural philosophers sought to silence critics by showing that their subject produced not scepticism but rather piety and faith. In fact they claimed that by looking at nature in a godly manner, one was inoculated against the materialism of Hobbes, the deistic dualism of Descartes, or the pantheism of Spinoza.<sup>3</sup> This claim, of course, contained a strong dose of propaganda. By self-consciously labelling its Fellows as 'Christian philosophers' who looked to God instead of Aristotle or the Pope as the one true authority, the Royal Society of London made a compelling case for the orthodoxy, piety and efficacy of its approach to knowledge.<sup>4</sup> Yet the religious sincerity of Fellows like Boyle was indisputable. Citing precedents from Patristic sources and Christ's parables, natural philosophers like Boyle depicted nature as God's temple and natural philosophers as its priests.<sup>5</sup>

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<sup>2</sup>A. Cunningham and P. Williams, 'De-centring the "Big Picture": The Origins of Modern Science and the Modern Origins of Science', *BJHS*, 26 (1993), 407-32: 421-25.

<sup>3</sup>S. Schaffer, 'Godly Men and Mechanical Philosophers: Souls and Spirits in Restoration Natural Philosophy', *Science in Context*, 1 (1987), 55-85.

<sup>4</sup>T. Sprat, *History of the Royal Society* (London, 1667), eds. J.I. Cope and H.W. Jones (Saint Louis, 1958); P. Dear, 'Totius in verba: Rhetoric and Authority in the Early Royal Society', *Isis*, 76 (1985), 145-61, esp. 151; P.B. Wood, 'Methodology and Apologetics: Thomas Sprat's *History of the Royal Society*', *BJHS*, 43 (1980), 1-26.

<sup>5</sup>H. Fisch, 'The Scientist as Priest: A Note on Robert Boyle's Natural Theology', *Isis*, 44 (1953), 252-65; J.E. McGuire, 'Boyle's Conception of Nature', *Journal of the History of Ideas*, 33 (1972), 523-42.

Here one needs to distinguish proponents of a 'theology of nature' from those who advocated a 'natural theology'. Theologians of nature (or 'Christian philosophers') like Boyle drew on natural reason and on Scripture to elucidate a system of beliefs about the natural world and God's involvement in it. In contrast, natural theologians sought knowledge of God through the use of innate or natural reason alone, without aid from Scripture. This knowledge could include not only evidence of God's existence or His attributes ('demonstrative' natural theology) but also evidence supporting specific theological doctrines. As John Brooke has noted, a 'particular theology of nature may countenance a particular form of natural theology, but the two are not the same'.<sup>6</sup>

Most often cited in the eighteenth century as the exemplar of a godly approach to nature was Isaac Newton.<sup>7</sup> For Newton, infinite space was God's sensorium.<sup>8</sup> Only providential design, he suggested, could explain the admirable balance exhibited within our solar system between planetary centrifugal forces and gravity's centripetal pull. Such arguments from design--that natural phenomena, in their regularity, intricacy, or in other purposeful or useful attributes, testified to God's existence and His wisdom, power or benevolence--became the most prominent component of natural

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<sup>6</sup>On this distinction see J.H. Brooke, 'Natural Theology in Britain from Boyle to Paley', in Brooke and R. Hooykaas, *New Interactions between Theology and Natural Science* (Milton Keynes, 1974), pp. 5-54: 8-9.

<sup>7</sup>R. Yeo, 'Genius, Method, and Morality: Images of Newton in Britain, 1760-1860', *Science in Context*, 2 (1988), 257-84.

<sup>8</sup>J.H. Brooke, 'The God of Isaac Newton', in J. Fauvel et al., eds., *Let Newton Be! A New Perspective on His Life and Works* (Oxford, 1988), pp. 168-83; J.E. McGuire, 'Newton on Place, Time, and God: An Unpublished Source', *BJHS*, 11 (1978), 114-29; S. Schaffer, 'Natural Philosophy and Public Spectacle in the Eighteenth Century', *History of Science*, 21 (1983), 1-43: 4-5.

theology.<sup>9</sup>

Although Newton's image of a clockmaker God providentially sending comets to wind the universe would be severely criticized, and although similar images of active providence were increasingly curtailed by those who exchanged voluntarism for self-regulating laws of nature,<sup>10</sup> arguments from design and from analogy remained common and persuasive in eighteenth-century natural theology. Ray's *The Wisdom of God Manifested in the Works of the Creation*, published in 1691 but largely written in the 1650s, was the representative text. The Boyle Lectures--of which Derham's lectures on physico-theology in 1711 and 1712 and his efforts in astro-theology in 1715 proved the most popular--employed similar examples drawn from nature to assert God's existence and His continuing activity in and sovereignty over His creation.<sup>11</sup> Despite damaging critiques of arguments from design produced by David Hume and Immanuel Kant in the latter half of the century,<sup>12</sup> Ray's and Derham's rational and theistic natural theology based on final causes remained popular and palatable well into the nineteenth century.

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<sup>9</sup>J. Dillenberger, *Protestant Thought and Natural Science* (Notre Dame, 1960, 1988), pp. 147-53; F. Ferré, 'Editor's Introduction' to W. Paley, *Natural Theology* (New York, 1963), esp. pp. xiv-xxvii; *idem*, 'Design Argument', in P.P. Wiener, ed., *Dictionary of the History of Ideas* (New York, 1968, 1973), I, 670-77.

<sup>10</sup>J. Gascoigne connects a growing preference for a God Who works through self-regulating laws to the political calm of mid-eighteenth century England. He sees a revival of a more visibly interventionist God in response to the French Revolution and political instability in England in the early 1800s. See his 'From Bentley to the Victorians: The Rise and Fall of British Newtonian Natural Theology', *Science in Context*, 2 (1988), 219-56: 230-31. See also P.M. Heimann, 'Voluntarism and Immanence: Conceptions of Nature in Eighteenth-Century Thought', *Journal of the History of Ideas*, 39 (1978), 271-83; S. Shapin, 'Social Uses of Science', in G.S. Rousseau and R. Porter, eds., *The Ferment of Knowledge* (Cambridge, 1980), pp. 111-24 ('Strategies of Enlightenment matter-theory').

<sup>11</sup>J.J. Dahm, 'Science and Apologetics in the Early Boyle Lectures', *Church History*, 39 (1970), 172-86.

<sup>12</sup>P. Addinall provides a useful summary of Hume's position in *Philosophy and Biblical Interpretation* (Cambridge, 1991), p. 33.

Lending indirect support to a rational and theistic natural theology was Scottish common-sense philosophy. This came in response to disturbing doubts, expressed by John Locke, George Berkeley, and Hume, as to the reliability of human senses and thus of humanity's knowledge of nature. Such doubts were repudiated by upholders of common-sense philosophy like Thomas Reid and Dugald Stewart. They argued that human sensory perceptions are reliable, that matter does in fact exist, and that spirit too exists. Great admirers of Francis Bacon, they supported induction and opposed materialism. Dick may be counted in this school. Besides asserting the existence of spirit, Dick once asked his readers, 'what do we know of religion, except the notions we have acquired through the medium of the senses?... Every fact contained in the Bible embodies in it a description and exhibition of *sensible* objects, without the intervention of which we could have no ideas of religion at all'.<sup>13</sup>

Also lending indirect support to natural theology was Joseph Butler (1692-1752). Bishop of Bristol and later of Durham, Butler wrote his most famous work, *The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature* (1736), to refute deists. Henry Brougham wrote of it as being 'the most argumentative and philosophical defence of Christianity ever submitted to the world'.<sup>14</sup> In its pages Butler observed that the very arguments which were used by sceptics to cast doubt on Scripture were equally damaging against that knowledge of nature which humans *qua* humans recognize as being certain. Such arguments were therefore merely exercises in logic-chopping. Analogies might produce only probabilities, Butler

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<sup>13</sup>Dick, *Mental Illumination*, p. 420. Since he studied at Edinburgh from 1794 to 1800, Dick may have attended Stewart's lectures (Stewart was then Professor of Moral Philosophy).

<sup>14</sup>H. Brougham, *A Discourse of Natural Theology* (London, 1835), p. 202.

admitted. 'But to Us, probability is the very guide of life'.<sup>15</sup>

Natural theology based on evidence of design exhibited in the natural world reached its apotheosis in Britain with Paley's *Natural Theology* (1802). For Paley 'marvellous' adaptations in nature, illustrated so well by the human eye and human and comparative anatomy (which in turn were illustrated in attractive plates in later editions of his book), displayed marks of design or purpose. These marks, he wrote, 'are too strong to be gotten over. Design must have had a designer. That designer must have been a person. That person is GOD'.<sup>16</sup> Paley used a mechanistic and systematic approach to evidence from nature and presented his natural theology 'as a demonstrative proof of God's existence which would persuade any unprejudiced person'.<sup>17</sup> Written in an engaging style, Paley's work was enormously popular because it helped people to interpret the natural world while seeming to demonstrate conclusively God's existence.

Yet the extent of Paley's success was ultimately attributable to natural theology's flexibility as a cultural resource.<sup>18</sup> Before examining Dick's

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<sup>15</sup>J. Butler, *Analogy* (London, 1736, 1900), p. 2. On the importance of the Butlerian tradition in the nineteenth century, see B. Hilton, *Age of Atonement* (Oxford, 1988); and E.J. Garnett, 'Bishop Butler and the Zeitgeist: Butler and the Development of Christian Moral Philosophy in Victorian Britain', in C. Cunliffe, ed., *Joseph Butler's Moral and Religious Thought: Tercentenary Essays* (Oxford, 1992), pp. 63-96.

<sup>16</sup>W. Paley, *Natural Theology; or Evidences of the Existence and Attributes of the Deity, collected from the Appearances of Nature* (Oxford, 1826), II, 137.

<sup>17</sup>P. Addinall, *Philosophy and Biblical Interpretation*, p. 39.

<sup>18</sup>See the following articles by J.H. Brooke: 'Natural Theology in Britain from Boyle to Paley', in Brooke and R. Hooykaas, *New Interactions*, pp. 5-54; 'The Natural Theology of Geologists: Some Theological Strata', in *Images of the Earth: Essays in the History of the Environmental Sciences*, eds. L. Jordanova and R.S. Porter (Chalfont St Giles, 1979), pp. 39-66; 'Why did the English Mix their Science and their Religion?', in S. Rossi, ed., *Science and Imagination in Eighteenth-century British Culture* (Milan, 1987), pp. 57-78; 'Science and the Fortunes of Natural Theology: Some Historical Perspectives', *Zygon*, 24 (1989), 3-22.



approach to natural theology, this flexibility needs to be delineated. Natural theology could be used to resolve debates on the soundness of interpretations of Scripture and also to reduce errors which arose in translating it; it could help to illuminate obscure passages of the Bible;<sup>19</sup> it could promise insights into, and foreknowledge of, the coming millennium, and even serve to advance the millennium by increasing knowledge as prophesied in Daniel 12:3-4;<sup>20</sup> it could be made doctrinally neutral, thus mediating between Christian denominations and traditions; it could supply unity to emerging scientific disciplines;<sup>21</sup> it could counter threats from secular interpretations of nature by offering a rational defence of Christianity, thereby promoting the moral worth of science; it could, by bringing unity to religious and scientific pursuits, prove psychologically comforting to individuals who pursued both; it could supply regulative principles for the interpretation of evidence from the organic world;<sup>22</sup> it could provide a context amenable to the popularization of science while serving 'to baptize fresh-air fun';<sup>23</sup> and it could serve socio-political roles, such as providing evidence that Church, Monarch, Parliament and a hierarchical society had analogues in nature and were therefore rightful, even righteous.<sup>24</sup>

Dick's theology of nature drew on many of these roles. That natural

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<sup>19</sup>This was argued by Galileo, among others. See R.S. Westman, 'The Copernicans and the Churches', in D. Lindberg and R.L. Numbers, eds., *God & Nature*, pp. 76-113, esp. 102-03.

<sup>20</sup>C. Webster, *The Great Instauration: Science, Medicine and Reform 1626-1660* (London, 1975), esp. pp. 506-07.

<sup>21</sup>R.M. Young, *Darwin's Metaphor: Nature's Place in Victorian Culture* (Cambridge, 1985), p. 127.

<sup>22</sup>This point is made by W.F. [S.F.] Cannon, 'The Problem of Miracles in the 1830's', *Victorian Studies*, 4 (1960), 5-32: 11.

<sup>23</sup>W.F. [S.F.] Cannon 'The Normative Role of Science in Early Victorian Thought', *Journal of the History of Ideas*, 25 (1964), 487-502: 487.

<sup>24</sup>J. Gascoigne, 'From Bentley to the Victorians', *passim*.

theology could be made doctrinally non-controversial appealed to him, since it helped him to advance his philosophy of religion, which, by espousing the uncontentious 'basics' of Christian belief, targeted Christians of all denominations. Natural theology also gave unity to his synoptic treatment of the sciences, spurred their popularization and testified to their moral worth. It served to counter secularization in society, an advantage to which he was especially sensitive. And, in providing reassurance to those desiring to pursue seriously both science and Christianity, it almost certainly contributed to Dick's own mental well-being.

Yet Dick did not employ natural theology in its role of demonstrating the existence of God. For Dick, such evidence just was not needed: God's existence was fundamental. In Dick's words, 'A firm conviction of the existence of God...lie[s] at the foundation of all religion both natural and revealed'. If proof was needed, one should look to Revelation and to the powerful and direct way which God's moral code spoke to human consciences. However, Dick did use evidence from nature to demonstrate key physical or natural attributes of God, such as His omnipotence, infinite wisdom and boundless benevolence. Humans needed to experience such tangible evidence drawn from nature, Dick believed, to conceive properly and to believe truly in these natural perfections of God.<sup>25</sup>

Human history, Dick reminded his readers on the very first page of his *Christian Philosopher*, showed that man was 'a depraved intelligence'. Hence human reason alone was a 'feeble and insufficient guide' in humanity's study or worship of God. By themselves, studies of God's natural works could not lead one to true knowledge of God. Nature had to be studied in the light of Revelation, and vice versa. Neither form of divine evidence superseded the

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<sup>25</sup>Dick, *Christian Philosopher*, I, 25.

other; rather, each carried the other forward to perfection.<sup>26</sup>

It is interesting here that Dick, in developing his theology of nature, referred most frequently to the writings of Boyle, Ray, Derham and Nieuwentyt, and not explicitly to Butler, the Scottish common-sense school, or Thomas Chalmers. He clearly admired the devotional qualities of the former writers and respected the way in which they evinced God's physical attributes using evidence from nature. He did not, however, adopt their agenda of demonstrating God's existence through the design argument or through human reason. Again, Dick, like many evangelicals, believed human reason had been rendered unreliable by original sin. Thus it was no surprise that he rarely cited Paley and did not place him in the company of the aforementioned 'Christian philosophers'. This raises the question of how Dick's theology of nature fit within the context of his day, a question addressed in the next section of this chapter.

### 3.2 Dick and Natural Theology in Britain from 1800 to 1860

The years 1800 to 1860 in Britain were characterized by a remarkably heterogeneous natural theology which cannot be reduced to one discipline or type, whether Paleyan or otherwise. For example, the authors of the *Bridgewater Treatises* (1833-36), in the words of J. Dillenberger, suggested 'remarkably new lines of exploration' in natural theology, a point which has been conclusively demonstrated by Jon Topham.<sup>27</sup> Nomological forms of

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<sup>26</sup> *Ibid.*, I, 21-6; II, 124.

<sup>27</sup> J. Dillenberger, *Protestant Thought and Natural Science*, p. 208; J. Topham, 'Science and Popular Education in the 1830s: the Role of the *Bridgewater Treatises*', *BJHS*, 25 (1992), 397-430; *idem*, '"An Infinite Variety of Arguments": The *Bridgewater Treatises* and British Natural Theology in the 1830s' (Lancaster Univ. Ph.D. thesis 1993). Also useful is D.W. Gundry, 'The *Bridgewater Treatises* and their Authors', *History*, 31 (1946), 140-52.

natural theology were preferred by William Whewell, the anatomist Richard Owen,<sup>28</sup> and Baden Powell (Savilian Professor of Geometry at Oxford), with Powell coming to deny that science could provide direct external evidence of God.<sup>29</sup>

Within this milieu, Dick was notable for his unusual sensitivity to the incursion of secular values. He was a traditionalist who called for the reunification of science with Christianity, with science serving in its traditional role of handmaid. Preferring not to single out British authors as targets for his polemics, he instead attacked the writings of Buffon, Diderot, Laplace and other 'infidels' of the 'Continental school'. Their writings, Dick declared, were materialistic and failed to include enough (or any) references to God. Together they posed a dire threat to Christianity. Dick's solution--simply that science should never be separated from Christian worship--was pious yet somewhat naïve.

Dick's proposed solution placed him in stark contrast to most of his contemporaries, including the majority of the Bridgewater authors. As F.M. Turner has noted, 'with the exceptions of [William] Kirby and [William] Prout, the Bridgewater authors firmly separated scientific knowledge and scripture'.<sup>30</sup> With respect to Kirby, a high church clergyman and naturalist, his Hutchinsonian emphasis on nature 'as an open though mystical book' with natural objects as cryptic symbols was antithetical to Dick's view

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<sup>28</sup>Owen believed that the unity of plan displayed in the skeletal archetype of vertebrates, and the subtle adaptations of this archetype to meet the individual needs of each species, best demonstrated design. See D. Ospovat, *The Development of Darwin's Theory: Natural History, Natural Theology, and Natural Selection* (Cambridge, 1981), pp. 20-23.

<sup>29</sup>P. Corsi, *Science and Religion: Baden Powell and the Anglican Debate, 1800-1860* (Cambridge, 1988). See also R.C. Curtis, 'Essay Review: Baden Powell and the Whewell Legend', *Annals of Science*, 47 (1990), 301-12.

<sup>30</sup>F.M. Turner, *Contesting Cultural Authority: Essays in Victorian Intellectual Life* (Cambridge, 1993), p. 111.

that lessons from nature were unambiguous and accessible to all.<sup>31</sup> Dick seems not to have mentioned Prout's treatise.

In fact, of the eight Bridgewater treatises, one might have expected Dick to cite Whewell's treatise since it dealt with astronomy. Since he admired Thomas Chalmers, dedicating a book to him, one might have expected a reference here as well. Both these treatises, moreover, were informed by evangelical concerns. Yet it was not these treatises which Dick recommended to his readers but those of Bell and Buckland. Otherwise he ignored the series. Such a dearth of references to the *Bridgewater Treatises* was perhaps attributable to the less immediate way in which these treatises linked science to Christian theology. As Jon Topham rightly comments, the treatises represented 'safe' science, but 'what constituted safe and dangerous science was context-specific, and depended on the ideology of the party in question'.<sup>32</sup> Dick may have shied away from the *Bridgewater Treatises* precisely because he preferred more transparently devotional theologies of nature.

Indeed, in 1833, the year that the *Bridgewater Treatises* first began to appear, Dick lamented that 'we have no modern Rays, Derhams, Boyles, or Nieuwentyts, to make the light of our recent discoveries in science bear upon the illustration of the perfections of the Deity, and the arrangements of his providence'. Not only had 'no modern system of [Derham's] *Physico-Theology*' been written to counter 'Continental infidels', Dick noted with disappointment. But 'in most of our colleges and universities, there appears a studied anxiety to avoid every reflection that wears the semblance of

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<sup>31</sup>W. Kirby, *On the History, Habits and Instincts of Animals*, 2 vols. (London, 1835), I, 1; II, 524-25.

<sup>32</sup>J. Topham, 'Science and Popular Education in the 1830s', 404.

religion'.<sup>33</sup> For Dick, it was not only the University of London (founded in 1826) which was godless.

Dick further complained about Britain's universities to the Rev. Dr. Eliphalet Nott, President of Union College in New York, stating that in them

little or no attention is paid, even by their clerical instructors, to the religious interests of the students,--and that it would be considered as something approaching to fanaticism, were a judicious and pious minister to request the assembling of a body of students for the purpose of directing their attention to those things which are unseen and eternal. I trust, however, that the Spirit of Revivals... will, ere long descend upon the churches and seminaries of my native country and accompany all the political reforms and improvements which we have now in prospect.<sup>34</sup>

Few writers were so eagerly looking to revivals to restore a godly sense of purpose to Britain's politics and culture, to include natural theology. Until Hugh Miller's writings in the 1840s and 1850s, evangelical fervour was what set Dick apart and made his writings on science and religion keenly attractive to evangelical communities in Britain and in America.<sup>35</sup>

Even in elementary scientific treatises (or, in other words, those aimed at the most impressionable of audiences), Dick observed, God was scarcely mentioned. Instead, 'the attention of the student is kept constantly fixed on secondary causes and physical laws, as if the universe were a self-existent and independent piece of mechanism'. The result was that God was effectively 'banished, as it were, from his own creation'.<sup>36</sup> By de-emphasizing God,

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<sup>33</sup>Dick, *Improvement of Society*, pp. 444, 467.

<sup>34</sup>Dick to the Rev. Dr. E. Nott, 22 Dec. 1832, Nott Collection, Schaffer Library, Union College, Schenectady, New York.

<sup>35</sup>On the American context see chapters seven and eight.

<sup>36</sup>In his worries Dick was not alone. An anonymous reviewer agreed that books of science 'have generally avoided, with apparent design and care, every observation or allusion, which might expose the writer to a sneer as a religionist or a fanatic'. See 'Review of Dick's "Christian Philosopher"', *Wesleyan Methodist Magazine*, 3rd ser., 3 (1824), 33-40: 33. Similar worries were expressed in Anon., 'Divine Agency in the Material Universe', *The Christian Examiner*, and *General Review*, 18 (1835), 314-27.

natural philosophers were helping 'to foster a spirit of irreligion in youthful minds, and to accelerate their progress towards the gulf of infidelity and scepticism'. Christianity 'degenerates into something approaching to a mere inanity, when its spirit and principles are not carried into every department of human life and society', Dick concluded with vigour.<sup>37</sup>

In suggesting that British culture, in particular her colleges and intellectual discourse, was insufficiently imbued with Christian concerns and references to God, Dick might at first appear to have been a crank. For example, D.A. Hinton has concluded that popular science books of the 1830s were almost unanimous in supporting natural theology and in claiming that by studying nature one was necessarily led to contemplate God.<sup>38</sup> But Hinton failed to specify what form of natural theology was being supported. Before they gave their assent, evangelicals like Dick required more than a few remarks as to how design in nature was compatible with a divine plan.

To Dick, contemporary culture, to include natural theology, appeared to be drifting away from God. He wanted more than a God-of-the-gaps, more than an awarding of credit to God only when things could not be explained fully by science. Moreover, Adrian Desmond has shown that the 1830s witnessed significant radical support for materialistic and anticlerical forms of science.<sup>39</sup> In this context of emerging forms of deistic or even secular science, together with non-devotional and overly rationalistic natural theologies, Dick's call for a spiritual science with the courage of its Christian convictions becomes understandable.

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<sup>37</sup>Dick, *Improvement of Society*, pp. 444-45, 467.

<sup>38</sup>D.A. Hinton, 'Popular Science in England, 1830-1870' (Bath Univ. Ph.D. thesis 1979), pp. 219, 397.

<sup>39</sup>A. Desmond, *The Politics of Evolution: Morphology, Medicine, and Reform in Radical London* (Chicago, 1989), p. 62.

In calling for a more intensely devotional theology of nature, Dick suggested that such godly studies of nature not only served to demonstrate God's physical attributes but also served as the best intellectual preparation for the afterlife. Showing incredible confidence in the sheer capacity of the human mind to assimilate new information--even one thousand detailed lectures given in turn by angelic messengers despatched from other worlds would stimulate rather than satiate our minds, he suggested<sup>40</sup>--Dick concluded from this that God, Who never did anything without purpose, must have created humans with such capacious minds for an eternity of explorations in the afterlife. Only in the hereafter would the redeemed, in their unceasing explorations of the Creator's vast universe, be able fully to exercise their minds and enjoy uninterrupted bliss.

Enrolling Christ Himself as the ultimate itinerant lecturer, Dick predicted that in heaven the Messiah would give lectures 'on the plans and operations of Deity'. He further predicted that, because of their superior knowledge of God's creation, Christian philosophers like himself would be privileged upon entering heaven. Just before he retired from teaching in 1827, Dick avowed that 'That humble instructor whom we now despise, and whose sentiments we treat with contempt, may, in that world of intelligence and love, be our teacher, and our guide to direct our views of the attributes of the Deity'! Meek Secessionist schoolmasters might be stuck in humble positions in this life, yet in the hereafter they would inherit 'stations of superior eminence' from which they would direct 'the views and investigations of their brethren who enjoyed few opportunities of instruction in the present state'.<sup>41</sup> This was an interesting twist on an old theme, for natural philosophers in the seventeenth century had claimed that they 'would enjoy a

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<sup>40</sup>Dick, *Future State*, p. 55.

<sup>41</sup>Dick, *Solar System*, p. 173; *Future State*, pp. 262, 268-69, 274.



special role in a future millennial state, and deserved special privileges in the here and now'.<sup>42</sup> In Dick's heaven it was clear that, though all the redeemed were equal, some were, at least for a short while, to be more equal than others. In essence, Dick was using prophetic sources to support a particular vision of the afterlife which both complemented his own expertise and complimented his self-image as a Christian philosopher.

In preparing for the afterlife, Dick placed astro-theology above all other temporal studies. In part this was because he believed that it was in contemplating the heavens that one saw key natural attributes of God, such as His immensity and boundless love, literally manifested.<sup>43</sup> Also, he believed that whereas the heavens were largely if not completely untarnished by sin, the earth was in contrast scarred deeply by original sin, which had reduced it to 'little more than a majestic ruin'.<sup>44</sup> Further to support astro-theology, Dick, in an amazingly audacious passage, went so far as to appropriate the intensely compelling image of Christ on the cross to show that astro-theology led Christians to a deeper appreciation of the Atonement:

The cross of Christ is a centre from whence the Christian will survey the universe. The hill of Calvary will be his observatory. Oh! how unutterable will be the emotions with which he will "consider" the heavens, when he remembers that their almighty Maker is his Redeemer!.... There is a rapture felt in gazing on the starry sky, which can be only known to him in whose heart the Saviour is enthroned. He will see all the glories of creation reflected on the mediatorial work of that Saviour, and every discovery which expands his views of the

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<sup>42</sup>S. Schaffer, 'Godly Men', 58. Schaffer cites John Edwards as claiming that in heaven 'a Vertuoso shall be no rarity', and that the faculties of the redeemed would be improved to aid them in their studies of God's works. See J. Edwards, *Compleat History of all Dispensations and Methods of Religion* (London, 1699), pp. 744-45, cited by S. Schaffer, 'Occultism and Reason', in A.J. Holland, ed., *Philosophy, Its History and Historiography* (Dordrecht, 1985), pp. 117-43: 121.

<sup>43</sup>Aesthetic criteria were important too and are discussed in chapter five, section one.

<sup>44</sup>Dick, *Celestial Scenery*, pp. 9, 101.

former will exalt his conceptions of the latter.<sup>45</sup>

Dick's privileging of astro-theology draws attention to its continuing salience in early Victorian Britain. Too much can be made of Paley's preference for physico- instead of astro-theology. For Paley, the planets and stars were too distant and celestial mechanics too esoteric to afford the best means of illustrating God's existence and His physical attributes.<sup>46</sup> Natural history, he felt, had greater immediacy and wider appeal. Boyle had expressed identical reservations more than a century earlier.<sup>47</sup> Dick himself confessed that divine wisdom was most clearly seen not in the heavens but 'in the minute and delicate contrivances of organical structures'.<sup>48</sup> Paley did admit, however, that once one affirmed God's existence, astronomy afforded the most sublime view of Him. This was crucial for Dick and other evangelicals who used evidence from nature not to prove that God existed but to show devotion to and gratitude for His holy creation.

It would appear, then, that J. Gascoigne's suggestion that physico- and not astro-theology became more central and persuasive to audiences in Britain in the first half of the nineteenth century<sup>49</sup> needs to be modified so far as evangelical audiences were concerned. For the Rev. Andrew Thomson (1814-1901), senior minister of the United Presbyterian Church at Broughton Place in Edinburgh, no science surpassed astronomy's ability 'to enlarge our conceptions of the natural attributes of the Deity'. Even more crucially,

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<sup>45</sup>Dick, *Telescope & Microscope*, pp. 90-1.

<sup>46</sup>W. Paley, *Natural Theology*, II, 78.

<sup>47</sup>N.C. Gillespie, 'Natural History, Natural Theology', 26-7.

<sup>48</sup>Dick, *Christian Philosopher*, I, 70, 101.

<sup>49</sup>J. Gascoigne, 'From Bentley to the Victorians', pp. 232-44. In Brougham's and Bell's updated version of Paley, the section on astronomy was enlarged considerably more than most sections (with notes by the Rev. J. Brinkley). See W. Paley, *Natural Theology, with Illustrative Notes* (London, 1836), II, 15-57.

unlike geology and natural history, 'there are not many points on which its discoveries can be said in any way to bear upon the credibility of Scripture'.<sup>50</sup> As one evangelical periodical in 1848 bluntly put it, 'Geology... must be Christianized, as astronomy, and other once suspected sciences, have been'.<sup>51</sup> Astronomy retained its persuasive power and popularity for evangelicals precisely because it was less directly connected to contentious earthly matters than was geology or natural history. Moreover, unlike their counterparts in natural history, astronomical laws were largely free from alarming transformist implications with respect to humanity's origins as a species.<sup>52</sup>

Yet one must be wary of overstating astro-theology's importance even to Thomas Dick. Key questions like the origin of evil and the cause of humanity's depravity, key doctrines like the immortality of the soul and the reality of a future state, key moral attributes of God like His mercy and love as demonstrated by Christ's Atonement: these were most clearly revealed in Scripture, affirmed Dick. In the next section, Dick's views on these key theological doctrines are analysed in more detail. These are then related to the beliefs of his evangelical contemporaries.

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<sup>50</sup> A. Thomson, 'Connexion between the Discoveries of Science and True Religion, and the Manner in which they Illustrate Each Other', in *Four Lectures to Young Men; Delivered at the Request of the Edinburgh Young Men's Society* (Edinburgh, 1842), p. 25.

<sup>51</sup> Anon., 'Scripture and Geology--Are they ever Discordant?', *The Free Church Magazine*, 5 (Apr. 1848), 104-07: 106. Dick's views on geology are examined in chapter four, section three.

<sup>52</sup> See R.R. Yeo, 'The Principle of Plenitude and Natural Theology in Nineteenth-century Britain', *BJHS*, 19 (1986), 276-77; and A. Desmond's *The Politics of Evolution*.

### 3.3 Thomas Dick's Theology within an Evangelical Context

Though he seemed to be truly evangelical in his views, he dwelt more upon the philosophy of religion, and especially the connexion of religion with science, than upon those generally admitted truths which we are accustomed to identify with the life and power of Christianity.

Rev. William B. Sprague on his visit with Dick<sup>53</sup>

This section examines Dick's theology and the roles which it fulfilled in his writings within an evangelical context. Dick believed he could offer to his readers a metaphysically simplified and morally revived form of Christian theology underpinned by Christianized natural knowledge. He hoped that this theology would heal sectarian schisms and make divisive doctrinal disputes largely obsolete, thereby quickening the growth of Christian cooperation and brotherhood. Natural knowledge provided a unifying framework for Dick because he believed that, when it was acquired with reverence and care, it could always be reconciled with Scripture. For Dick the pursuit of natural knowledge was a form of worship. Nature for him was always to be studied 'in connexion with the moral arrangements of the Almighty, the renovation of the world, and the eternal destiny of man'.<sup>54</sup> Studied properly, it engendered feelings of love, gratitude and pious adoration for the Creator, feelings which lay 'at the foundation of all true religion'.<sup>55</sup> Dick's emphasis on the study of nature as representing perhaps the clearest path to Christian truth and unity would be severely contested, however.

A few words about Dick's conception of God are in order here. God for Dick was an uncreated, eternal, omnipotent Creator Who called the universe into being out of nothing. He was everywhere immanent in nature yet He also

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<sup>53</sup>W.B. Sprague, *Visits to European Celebrities* (Boston, 1855), p. 292.

<sup>54</sup>Dick, *Solar System*, p. xiii; *Atmosphere*, p. 128.

<sup>55</sup>Dick, *The Diffusion of Knowledge. Being the First of a Course of Lectures delivered to Young Men, in connection with the Dundee Literary Societies' Union* (Dundee, 1851), pp. 13-14.

transcended His creation. In Dick's words, His essence 'pervades, actuates, and supports the whole frame of universal nature, and all the beings it contains; so that he is as intimately present with every created being... as that being is to itself'.<sup>56</sup> Existing as pure mind or spirit, He was wholly other than His works (except of course for human souls, which He made in His image) and utterly sovereign over them. Only through His incessant agency, either through a direct exercise of His will or through subordinate agents acting at His command, was matter sustained in motion.<sup>57</sup> Otherwise, 'the wheels of nature would stop, and the vast fabric of the universe would soon be transformed into one frightful and universal ruin'.<sup>58</sup> Such metaphors, drawn from visions of a Newtonian clockwork universe, were by the 1830s becoming long-in-the-tooth, but for Dick they had lost none of their bite.

Dick's voluntaristic conception of God as the immediate cause of all forces in nature was still intellectually respectable in the 1820s and 1830s, upheld by Scottish common-sense philosophers like Dugald Stewart and John Robison, Dick's mentor in natural philosophy.<sup>59</sup> It followed from this conception that by studying nature one was contemplating God and learning more about Him. Thus the study of nature became an expression of piety; it signified that one was sensitive to God's presence everywhere. In fact Dick went further and suggested that God 'can be contemplated only through the sensible manifestations he gives of his perfections'.<sup>60</sup> Thus God revealed

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<sup>56</sup>Dick, *Christian Philosopher*, I, 65.

<sup>57</sup>Dick, *Celestial Scenery*, p. 263.

<sup>58</sup>Dick, *Covetousness*, p. 173.

<sup>59</sup>See C.B. Wilde, 'Matter and Spirit as Natural Symbols in Eighteenth-century British Natural Philosophy', *BJHS*, 15 (1982), 99-131: 108. On Robison see C. Smith, '"Mechanical Philosophy" and the Emergence of Physics in Britain: 1800-1850', *Annals of Science*, 33 (1976), 3-29: 7-11, and chapter two, section one.

<sup>60</sup>Dick, *Philosophy of Religion*, p. 38, emphasis added.

Himself to humans only through His natural works and through Scripture. Moreover, Dick argued that the former revelation had preceded the latter, since God had given Scripture to humans only after they had fallen from grace. Our benightedness, in other words, had made necessary a special revelation. Freed from sin in the afterlife, the redeemed would no longer need Scripture; instead, as we have seen, they would worship God by exploring His physical universe.

With consensus on God's natural attributes reached through reverent studies of nature, consensus on God's moral attributes and on Christian theology, Dick asserted, would prove equally untroublesome. Confidently, Dick listed the 'basics' of Christian theology as

the fall of man, and his consequent depravity--the necessity of a Savior--the love of God in sending his Son into the world to be a propitiation for our sins--repentance towards God, and faith towards our Lord Jesus Christ, the necessity of being renewed in the spirit of our minds, and of prosecuting the path of universal holiness--the connection of the present state with the future, and the important realities of the eternal world.<sup>61</sup>

This simplified creed, Dick believed, would, together with Christ's two great commandments and a Christianized science, serve to unify Christians in one church, which would then evangelise the world as prophesied in Scripture.

What method did Dick use to develop his philosophy of Christianity? He answered this question by claiming that he had

kept his eye solely on the two Revelations which the Almighty has given to mankind,--THE SYSTEM OF NATURE, and the SACRED RECORDS, just as they stand,--without any regard to the theories of philosophers, the opinions of commentators, or the systems of theologians.

In this process, he stated that he had approached Scripture 'as a series of important facts, from which moral instructions are to be deduced, [rather] than as a system of metaphysical opinions for the exercise of the

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<sup>61</sup>Dick, *Mental Illumination*, p. 314.

intellect'.<sup>62</sup> His stated goal was to simplify and purify Christianity, making its laws comprehensible to all Christians everywhere.

Distancing himself from the disputatious heritage of his fellow Seceders, Dick largely avoided debates over church-state relations and other contentious issues and expressed dismay at the leading doctrinal disputes of his day:

And what are some of the important doctrines which frequently rouse such furious zeal? Perhaps nothing more than a metaphysical dogma respecting the sonship of Christ, absolute or conditional election, the mode of baptism... or a circumstantial punctilio in relation to the government of the church! While the peculiar notions of each party, on such topics, are supported with all the fierceness of unhallowed zeal, the grand moral objects which Christianity was intended to accomplish are overlooked, and the law of meekness, humility, and love, is trampled under foot.

For Dick, doctrinal disputes were usually unjustified if not irrelevant. 'There are heresies in conduct, as well as heresies in doctrine', he reminded his readers, 'and of all heresies, the former are the most pestilential and pernicious'.<sup>63</sup> Coming from a man who had been publicly defrocked and humiliated precisely because of heresy in conduct, this was a remarkably forthright statement.

In cautioning against doctrinal zealotry, Dick was not saying that issues of doctrine were never important. He himself condemned Antinomians for their refusal to regulate their personal conduct in strict obeisance to God's laws, and he censured those who argued that humanity's works could in any way be meritorious in the sight of God. This was 'a notion, as unphilosophical and absurd, as it is impious and unscriptural', declared Dick, for salvation was a gift of God's grace, not a reward for good behaviour.<sup>64</sup> Yet these were exceptional cases. To promote tolerance among Christians, Dick

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<sup>62</sup>Dick, *Philosophy of Religion*, pp. 6-7.

<sup>63</sup>Dick, *Philosophy of Religion*, pp. 429-32.

<sup>64</sup>Dick, *Philosophy of Religion*, pp. 288, 292-93.

deliberately emphasized moral conduct in place of doctrinal issues. He personally set an example by praising Quakers and Moravians, and he urged ministers to invite their counterparts from different Protestant denominations to swap pulpits and congregations on the Sabbath.<sup>65</sup> In praising individual Catholics for their piety, Dick extended an ecumenical olive branch as well.

Dick hoped that his irenic and ecumenical writings would produce a united Christian church with a theology consisting of indisputable 'facts' as teased out through a reverent study of God's Word and Works. He charted a *via media* between High Anglicans and Catholics like John Henry Newman, who were adept at making, and who assigned great meaning to, sophisticated distinctions in doctrine, and those like Henry Brougham who almost entirely excluded conventional Christian doctrine from their writings. Like his fellow Scotsman Thomas Erskine, author of *Remarks on the Internal Evidence for the Truth of Revealed Religion* (1820) and other works, Dick was dissatisfied with evangelical Christianity as defined and practised in his day. These men shared an emphasis on the Gospel as a message of love and a belief that piety was measured more accurately by moral conduct than slavish adherence to doctrinal particularities.<sup>66</sup>

However, in seeking to redefine evangelical theology, Dick and Erskine plotted essentially divergent courses. In contrast to Dick, Erskine had little use for evidence from nature, suggesting instead that the truth of Christianity was seen and felt most clearly in the ways in which it spoke to the consciences, and served the spiritual and moral needs, of believers. The tenor of Dick's approach was altogether different: he defined Christianity as 'a rational and tangible subject, addressed to the reason, the feelings, the

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<sup>65</sup> *Ibid.*, p. 448.

<sup>66</sup> On Erskine see J. Tulloch, *Movements of Religious Thought in Britain during the Nineteenth Century* (London, 1885), pp. 125-45.



hopes and fears, and the common sense of mankind' which derived its sense chiefly 'from the facts of Sacred History, the system of nature, and from the existing objects, scenes, and associations with which we are connected'.<sup>67</sup> Disparate approaches led to different conclusions. For instance, Erskine came in the 1830s to believe that a benevolent God of love would sanction only a universal atonement, whereas Dick found this belief to be contrary to a 'factual' reading of Scripture.

In affirming that expressions of love to God were incomplete without 'admiration of his wonderful works', that humanity's curiosity about God's works had in fact been implanted by Him, and that without 'competent knowledge' of His natural perfections humanity's knowledge of God would remain 'limited and obscure',<sup>68</sup> Dick made powerful claims as to the sacredness of natural knowledge and the authority of its interpreters. Indeed, Dick had the temerity to advise ministers that, since the study of God's works was expressly encouraged in numerous passages in Scripture,<sup>69</sup> they were therefore bound by duty to incorporate into their sermons lessons on 'the fabric of the universe' and the natural perfections of God displayed therein.<sup>70</sup>

Such affirmations and advice represented a thinly veiled attack by Dick on the practices and professional expertise of the theological clerisy. He condemned what he perceived to have been a 'zealous outcry' directed against sermons which did not exhibit 'a direct relation to what are termed the doctrines of grace'. This misguided zeal he attributed to the misbegotten

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<sup>67</sup>Dick, *Philosophy of Religion*, pp. 449-50.

<sup>68</sup>Dick, *Philosophy of Religion*, p. 86; *Christian Philosopher*, I, 25; *Improvement of Society*, pp. 235, 288.

<sup>69</sup>Among other passages, he cited Job 37:14, Isaiah 40:26, Jeremiah 10:12.

<sup>70</sup>Dick, *Philosophy of Religion*, p. 227.

fears of those who were 'afraid that the sanctity of the pulpit should be polluted' by descriptions of God's involvement in the natural world, and to the sinful pride and false conceptions of religion held by many who 'make pretensions to a high degree of spiritual attainments'. Noting repeatedly that God revealed Himself in nature as well as in Scripture, Dick upbraided clerics who criticized science, stating that their efforts to cast aspersions on its value by contrasting it with Revelation must 'have a pernicious effect on the minds of the mass of the Christian world'.<sup>71</sup>

To persuade Christians who were sceptical about, or opposed to, the incorporation of lessons on God's natural works and attributes into sermons or other events held on the Sabbath, Dick enlisted the support of Scripture and enumerated several advantages of lessons drawn from nature. In enlisting Scripture, he argued that Job had enjoined Christians to study God's works 'to acquire a specific and comprehensive knowledge of the Creator's designs'. Dick further argued that the study of God's presence in nature represented a return to prelapsarian practices and a time when humans possessed 'pure moral intelligence'. And he baldly asserted that those who undervalued God's material works were effectively condemning the Creator Himself.<sup>72</sup>

When he came to enumerate the advantages of lessons in natural knowledge, Dick noted how evidence from nature could be used to illustrate crucial Christian doctrines, such as the Fall. He also noted how lessons from nature were more easily understood by youth and laymen than abstract theology. They gave tangible support to divine truths whose 'slender hold' in the mind was due mainly to 'the want of those definite and impressive conceptions which can be acquired only by a minute and attentive survey of the works and

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<sup>71</sup>Dick, *Christian Philosopher*, I, 26, 30, 97; II, 180-81.

<sup>72</sup>Dick, *Christian Philosopher*, I, 27, 166-68.

dispensations of God'.<sup>73</sup> Here he especially honoured astronomy's ability to provide displays of God's omnipotence and glory, stating that 'to call in question the propriety of exhibiting such views in religious publications, or in the course of religious instructions, would be an approach to impiety, and an attempt to cover with a vail [sic] the most illustrious displays of Divine glory'.<sup>74</sup> Finally, by coming to appreciate the care evinced by God as He watched over even His humblest of creatures, humans would be reassured that He would surely not permit those He made in His image to perish.

Those who cherished millennial visions, Dick suggested, would also find much to value in science. As a guide both for humanity's moral reform and for the earth's physical reform, natural knowledge, Dick believed, could help to advance the millennium. Humans were not to wait for a miracle from God when He had granted to them the genius and energy to uncover, and to work within, the laws of nature to reform themselves and the earth.<sup>75</sup>

Fond of quoting Bacon's 'Knowledge is power',<sup>76</sup> Dick further extended the religious efficacy of natural knowledge by making it the basis for determining the correct meaning of passages in Scripture. In extending exegetical authority beyond the theological clerisy, however, Dick was again

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<sup>73</sup>Dick, *Philosophy of Religion*, p. 83.

<sup>74</sup>Dick, *Christian Philosopher*, I, 312.

<sup>75</sup>Dick, *Covetousness*, p. 240; *Christian Philosopher*, II, 302. Millenarians looked forward to a paradise on earth where social injustice would be eradicated for one thousand years prior to the final Judgment Day. Post-millenarians like Dick saw it as their Christian duty to improve the world as a precondition for Christ's return; pre-millenarians believed that only Christ's Second Coming would initiate the millennium. Dick was typical of moderate, post-millenarian religious thinkers, but unlike many he took no interest in calculating the date of Christ's return or in deciphering 'signs'. See W.H. Oliver, *Prophets and Millennialists: The Uses of Biblical Prophecy in England from the 1790s to the 1840s* (Oxford, 1978); and J.F.C. Harrison, *The Second Coming: Popular Millenarianism 1780-1850* (London, 1979).

<sup>76</sup>He cited it on the title page of two of his books: *Philosophy of Religion and Improvement of Society*.

challenging the skills and authority of theologians. It would seem that Dick had come away frustrated and disillusioned when he experienced firsthand the indifference of 'expert theologians' to his concerns. He wrote to George Combe in 1828 that

Divines who have made theology the study of their whole lives are not unfrequently unable to reconcile one doctrine of Scripture with another and whenever they get into difficulties, they uniformly cut short the discussion by telling us that Revelation is not amenable to reason. This I confess does not satisfy me. If the Deity has given such powers to man as enables him to scan so large a portion of his works, there is something like absurdity in saying that these powers are not competent to ascertain the meaning of his word - such a sentiment seems to me an impeachment of his wisdom, which, I am persuaded the men who use such expressions would not justify if they perceived its tendency.<sup>77</sup>

Dick brazenly proceeded to establish his own guideline for Scriptural exegesis, stating that 'Where a passage of Scripture is of doubtful meaning, or capable of different interpretations, that interpretation ought to be preferred which will best agree with the established discoveries of science'. Christians were not to tolerate any interpretation of Scripture which was 'inconsistent with any well authenticated facts in the material world'. By 'well authenticated' he meant 'those facts which are universally admitted, and the reality of which every scientific enquirer has it in his power to ascertain'. Dick unhesitatingly admitted that

the scientific student of Scripture alone can judiciously apply the canon to which I have adverted... for he knows the facts which the philosopher and the astronomer have ascertained to exist in the system of nature; from the want of which information many divines... have displayed their ignorance, and fallen into egregious blunders... which have tended to bring discredit on the oracles of heaven.<sup>78</sup>

Dick and other 'Christian philosophers' like Baden Powell and Dugald Stewart saw themselves, in the considerable knowledge of science they possessed, as being uniquely qualified to defend and advance Christianity. In Pietro Corsi's words, they believed that they could gird Christians against 'the

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<sup>77</sup>Dick to G. Combe, Jan. 1828, NLS MS 7221 ff 61-2.

<sup>78</sup>Dick, *Christian Philosopher*, II, 247-50.

dangers of the price of science, of demagogical appeals to reason, of attacks against the credibility of revelation launched in the name of science'. As a reward, they wanted 'to occupy the highest place in the hierarchy of intellectual authority'.<sup>79</sup> As the next section will demonstrate, such claims to authority did not go unchallenged by evangelicals.

### 3.4 Evangelical Responses to Science and in Particular to Thomas Dick

In the previous section, we saw how Dick attempted to redefine the practice of Christianity, and how his redefinition called into question the adequacy of the skills and expertise of theologians. In his system of belief, natural knowledge was to be taught from church pulpits and Christian philosophers like himself were to be recognized as experts in God's natural attributes and in Biblical exegesis. This section details the responses of evangelicals to these arguments and explores the more general question of how evangelicals received, integrated, and adapted science to their concerns. Evangelicals generally applauded Dick for showing that science could be harmonized with religion. Yet some evangelicals were disturbed by his trumpeting of science, finding it a less-than-worthy companion for the Gospel.

Dick's first book, the *Christian Philosopher*, was widely and quite favourably reviewed in the evangelical periodical press. An early complimentary response came in 1824 from the *Evangelical Magazine*, and *Missionary Chronicle*. Agreeing with Dick that divines and natural philosophers had been 'long at war', the *Evangelical Magazine* hailed him 'as the harbinger of peace' and recommended his work for 'the perusal of students both in Nature and Theology', since it showed that modern science was perfectly consistent with Christianity. A year later, the *Evangelical*

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<sup>79</sup>P. Corsi, *Science and Religion*, pp. 6, 47.

Magazine reviewed the second edition of the *Christian Philosopher*, noting that, if it was perhaps 'less eloquent' than Paley's *Natural Theology*, it was also 'more decidedly Christian' and therefore particularly well suited for intelligent youth, in whose hands it would 'create a thirst at once for true piety and useful knowledge'.<sup>80</sup> Similar sentiments as to how reading Dick's book would encourage piety and help inquisitive youth keep to the straight and narrow were expressed by several evangelical periodicals.<sup>81</sup>

Yet Dick's demand for greater recognition by Christians of the authority and religious utility of natural knowledge proved controversial. Whereas the *Evangelical Edinburgh Christian Instructor* found Dick's efforts to Christianize science laudable, it considered his attempt 'to give to Christianity more of a scientific character' wrongheaded. Noting that Dick never mentioned ministers except 'in a querulous and censorious tone', the *Instructor* preached that when ministers took to their pulpits, 'there they ought "to know nothing, save Jesus Christ and him crucified"'.<sup>82</sup>

In its review of Dick's *Christian Philosopher*, the *Wesleyan Methodist Magazine* echoed this statement, declaring that 'Preachers of the Gospel must be Preachers of CHRIST, or they forfeit their character. They must, like ST. PAUL, "know nothing" else, as the great subject of their preaching'. Outside the pulpit, however, preachers could and did enlarge their horizons. Contradicting Dick's claim that ministers were largely indifferent to natural philosophy, this reviewer asserted that they were in fact the keenest readers

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<sup>80</sup> *Evangelical Magazine*, new ser., 2 (1824), 21-2 (included in this issue was a passage from the *Christian Philosopher* on 'The Harmony of Theology and Natural Science', pp. 11-12); *Evangelical Magazine*, new ser., 3 (1825), 197-98.

<sup>81</sup> See reviews in the *Congregational Magazine*, 8 (1825), 271; *Baptist Magazine*, 17 (1825), 481; and the *New Baptist Magazine* (March 1825), the latter cited in DCA GD/Mus 54/5.

<sup>82</sup> 'Review of Campbell and Dick on Education', *Edinburgh Christian Instructor*, 23 (May 1824), 325-41: 339.

of the works of Derham, Paley, and other natural theologians. And to Dick's claim that Christians would become more humble, devout and pure by studying nature, this reviewer wonderingly wrote that 'we are sceptical, or rather quite incredulous'.<sup>83</sup> Yet despite their criticisms both the *Instructor* and the *Wesleyan Methodist Magazine* ended up recommending Dick's work.

Outside evangelical circles, however, Dick attracted support for his call for more religious authority to be granted to natural knowledge. The *Eclectic Review*, a liberal publication which was sympathetic to Dissenters, agreed with Dick that, as 'one of the two grand forms of Divine Revelation', God's works had suffered 'a quite irreligious neglect' by clergy and laity both. To rectify this neglect, it especially urged ministers to buy and study Dick's book. Ministers' conceptions of God's natural attributes were also found wanting by the *Scots Mechanics' Magazine*, a periodical aimed at skilled artisans. This magazine urged ministers to cultivate expanded notions of God's attributes as displayed in nature, affirming that they would then be better able to communicate to their parishioners 'the most sublime and exalted notions of the Supreme Creator'.<sup>84</sup>

As these reviews make clear, much was at stake here. The *Wesleyan Methodist Magazine's* remarkable declaration that ministers 'forfeit[ed] their character' when they extended the subject matter of their sermons beyond a Christocentric theology revealed that ministers' self-image was involved, as were concerns as to how one should best keep holy the Sabbath and the authority of God's Word versus His Works and the appropriateness of each in different contexts. One Evangelical minister who like Dick believed in the appropriateness of teaching science on the Sabbath was the Rev. Henry Duncan

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<sup>83</sup> 'Review of Dick's "Christian Philosopher"', *Wesleyan Methodist Magazine*, 3rd ser., 3 (1824), 33-40: 34-5.

<sup>84</sup> *Eclectic Review*, new ser., 21 (May 1824), 432-34; 'Mr. Dick, on Science and Religion', *Scots Mechanics' Magazine*, 1 (1825), 130-34: 130.

of Ruthwell. His efforts to teach lessons based on the natural works of God on Sunday afternoons, however, were rebuffed by his congregation, which considered them insufficiently sanctified for the Sabbath.<sup>85</sup> Adrian Desmond's sweeping claim that 'For an evangelical minister, revelation overshadowed natural theology; it made any attempt to prove God's actions from nature not only redundant but actually pernicious' would seem to have much validity.<sup>86</sup>

Surely it is premature, however, to characterize evangelical ministers as inveterate opponents of studies of the material works of God. They exhibited instead a range of attitudes which revealed important denominational and national differences to which historians must remain sensitive. It is true that they normally put revelation first, and some of them did warn that, when insufficiently informed by Scripture, natural theology encouraged one to rely overmuch on reason, to forget one's sinfulness and need for grace, and even to entertain deistic notions. Yet it is clear that evangelical ministers as well as their flocks demonstrated considerable activity and flexibility in the culture of their day,<sup>87</sup> to include taking an interest in science within a devotional context.

With its emphasis on human reason, natural theology, narrowly conceived, did have a chequered past in evangelical circles, as a brief historical survey will show. In eighteenth-century Scotland, natural theology was fostered within the context of the Scottish Enlightenment primarily by Moderates in the

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<sup>85</sup>S. Hall, *Dr. Duncan of Ruthwell, Founder of Savings Banks* (Edinburgh, 1910), pp. 40-41.

<sup>86</sup>A. Desmond, *Politics of Evolution*, p. 64.

<sup>87</sup>Particularly useful here is D.M. Rosman, *Evangelicals and Culture* (London, 1984).



Established Church.<sup>88</sup> They celebrated both the human mind's capacity to uncover God's natural laws and humanity's progressive nature. In comparison, their rivals the Evangelicals had an acute awareness of the limits of human reason and of the complexity and paradoxical nature of natural evidence and preferred to stress intense, inner experiences of faith. In the Evangelical resurgence of the nineteenth century,<sup>89</sup> Thomas Chalmers emerged as the leading Evangelical theologian. In the 1810s, he categorically rejected natural theology, which placed him at odds with most of his Evangelical contemporaries. Yet by the 1830s he had come to believe that natural theology could serve to fix the attention of the sceptic on the claims of Scripture. It could, therefore, in an important but limited sense, serve as a stepping stone on a pilgrim's journey towards salvation, a journey consummated only when Christ Himself had been embraced.<sup>90</sup>

That natural theology and other forms of natural knowledge had important but ultimately secondary and restricted roles to play in a Christian's life was a belief widely shared by evangelicals of all stripes. Recalling St. Paul's dictum that the just were to live by faith and in Jesus Christ and his warning against knowledge as 'vain deceit', evangelicals were wary of placing undue trust both in natural knowledge and in its perhaps self-aggrandizing and prideful exponents. Brought up on the notion that only the Divine Word had

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<sup>88</sup> Among other sources on the Scottish Enlightenment see A.C. Chitnis, *The Scottish Enlightenment* (London, 1976); P. Jones, ed., *Philosophy and Science in the Scottish Enlightenment* (Edinburgh, 1988); J.R.R. Christie, 'The Origins and Development of the Scottish Scientific Community 1680-1760', *History of Science*, 12 (1974), 122-41.

<sup>89</sup> On the rise of Evangelicals and their involvement in science, see J.G. Burke, 'Kirk and Causality in Edinburgh, 1805', *Isis*, 61 (1970), 340-54; J.B. Morrell, 'The Leslie Affair: Careers, Kirk and Politics in Edinburgh in 1805', *Scottish Historical Review*, 54 (1975), 63-82; P. Baxter, 'Science and Belief in Scotland', ch. 2, esp. pp. 38-42.

<sup>90</sup> J. Topham, 'Evangelicals, Science, and Natural Theology in Early Nineteenth-Century Britain: The Case of Thomas Chalmers', forthcoming in 1996. My thanks to Jon Topham for sending me a typescript of this paper.

unassailable authority, it seemed improper and impertinent to evangelicals to presume to modify Scripture in light of recent developments in science. And, in the context of a living and heartfelt faith, natural theology could appear to be too rationalistic, too lacking in heartfelt spiritual meaning, to be of much relevance.

Such concerns were advanced with considerable forcefulness by the evangelical *Christian Observer* in 1835. In reviewing Henry Brougham's treatise on natural theology, the *Observer* wrote that Brougham advocated

a generalized religion, favourable and flattering to the fashionable latitudinarian system of associating in political clubs, philosophical societies, mechanics' institutes, and mixed company, undisturbed by those differences in religious creeds which cannot be overlooked where men are in earnest about religion; and easily compromising all "slight shades of sentiment" in one common, conventional, lax admission of the being, power, and providence of a God.<sup>91</sup>

For the *Observer*, religion was not something to be entrusted to men conversing in mechanics' institutes and other unsanctified public spaces. All that would be produced here were watered down confessions of faith which would be at best misguided and at worst completely contrary to Divine Revelation. For the *Observer*, natural theologians of Brougham's disposition were perfidious fifth columnists who, in their heartless natural reason, betrayed the true faith.

However, the *Observer* did not altogether dismiss natural theology. By showing the strong probability that God had made a direct revelation to humans, natural theology did help to silence both 'gainsayers' who questioned the authority of the Gospel and the doubts of true believers. Echoing Chalmers, the *Observer* admitted that natural theology was important 'as a step in the evidences for Divine Revelation' which could assist non-believers on their path to salvation.<sup>92</sup> More than a few evangelical periodicals in the

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<sup>91</sup>Anon., 'Review of Lord Brougham's Discourse on Natural Theology', *Christian Observer*, 35 (1835), 687-99, 738-50, 804-19: 690.

<sup>92</sup>*Ibid.*, 689, 691, 697-8.

1820s and 1830s, such as the *Wesleyan Methodist Magazine*, joined the *Observer* in expressing only the most guarded support for natural theology, preferring instead forms of knowledge (such as Mosaic geology) which were more closely tied to literal readings of Scripture.<sup>93</sup>

However, when evangelicals saw works on science as being sufficiently informed or marked by a reverent concern for Scripture and God, they unhesitatingly embraced them, as reviews of Dick's later works show. The *Evangelical Magazine* remained steadfast in its support of Dick's theology of nature for precisely this reason, writing in 1833 that

We do not know of any modern writer who has done more to furnish plain Christians with weapons whereby they may be enabled to defend the facts of revelation...[His science is] tributary to the interests of the cross and the good of souls....eminently suitable as a present for young men of inquiring habits of mind...<sup>94</sup>

Throughout the 1830s and 1840s, the *Evangelical Magazine* repeatedly reaffirmed that Dick's works exhibited a firm belief in and respect for Scripture; that they showed science and evangelical Christianity to be in perfect harmony; that they helped readers to acquire deeper reverence for God; and that they were written simply and were well adapted to common readers, especially intelligent youth.<sup>95</sup>

Even the most conservative of evangelical periodicals adjudged Dick's works to be invaluable. In supporting Mosaic geology against looser interpretations of Scripture by geologists like Charles Lyell, the *Christian*

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<sup>93</sup> 'Methodist Attitudes to Science, c.1830-70', unpublished paper presented by Mark Clement, 2 May 1994, University of Oxford. As Jon Topham has noted, many evangelicals were similarly reluctant to support the *Bridgewater Treatises* because their connection to Scripture seemed tenuous. J. Topham, 'Science and Popular Education in the 1830s', esp. 423-29.

<sup>94</sup> 'Review of Dick's *Improvement of Society*', *Evangelical Magazine*, new ser., 11 (1833), 309-10.

<sup>95</sup> *Evangelical Magazine*, new ser., 14 (1836), 20; new ser., 16 (1838), 69-70; new ser., 18 (1840), 438; new ser., 24 (1846), 193; new ser., 25 (1847), 594.

*Lady's Magazine* had written that

man by nature knows not God, and nothing which springs from nature can teach him God. If it could, revelation would indeed be useless.... Let us give to literature and science their true place as handmaids to faith... let us never for a moment dishonour Him, by placing the investigations of our feeble minds... in the place of those eternal truths, which are able to make us wise unto salvation.<sup>96</sup>

In reviewing Dick's *Celestial Scenery*, however, this magazine adopted an entirely different tone, applauding Dick for 'the earnestness with which he deduces from his splendid theme arguments on the power and majesty of the Most High'. These arguments placed his book 'infinitely above the deepest researches of scientific skill, where God is either disregarded, or defrauded of the open honour due to his glorious name'. In the *Revivalist*, another thoroughly religious periodical and one that studiously avoided reviewing works on science, an anonymous reviewer declared that, although Dick's *Celestial Scenery* was not exclusively dedicated to religious concerns, 'it must be eminently useful in shewing the intimate connexion between true science and piety, and leading the well educated to serious reflection'.<sup>97</sup>

These reviews, and others like them, reveal that the praiseworthy qualities of Dick's works to evangelical audiences were their safety, their pious tone, their deference to revelation. Again and again evangelical periodicals urged their readers to hand Dick's books to intelligent and impressionable youth. It is clear that evangelicals saw Dick's works as providing safe entry into the mysteries of science. As science became more pervasive in early Victorian society, and as evangelicals began to explore its claims in greater detail, Dick's works provided them a point of departure as well as a map by which they could steer their future explorations along safe

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<sup>96</sup>[C.], 'Remarks on Mr. S. Turner's "Sacred History of the World"', *The Christian Lady's Magazine*, 4 (1835), 497-502: 501-2.

<sup>97</sup>*The Christian Lady's Magazine*, 9 (1838), 180-82: 182; and *The Revivalist*, 7 (1838), 71.

avenues.

Yet even Dick's 'safe' devotional theology of nature at times offended the sensibilities of some evangelicals. A particularly sensitive area for evangelicals was the doctrine of Christ's redemption. Though evangelicals considered themselves to be depraved creatures, they also believed that humanity had experienced, in Christ's atoning death, a uniquely glorious display of God's benevolence and love which had saved them from perdition. In preaching exclusively on Christ and especially on His atonement, ministers saw themselves as pursuing the only course which even remotely began to satisfy the debt that humans owed to Him.

In his efforts to convey to Christians the importance of God's natural works, however, Dick called into question the centrality of the Redemption. Those who avowed that the Redemption was, and would forever remain, God's most glorious act, Dick stated in 1823, were making a 'presumptuous assumption' that tended 'to limit the perfections of [the] Deity'.<sup>98</sup> Five years later, he declared that the Atonement would not 'afford full and uninterrupted scope to the faculties of the saints in heaven, throughout an unlimited duration'.<sup>99</sup> By lowering, ever so slightly, the importance of the Atonement, Dick was effectively elevating the authority of Christian philosophers like himself who were best fitted to catch a glimpse of displays of God's glory in the universe which were potentially superior to the Atonement.

This was too much for an otherwise near-silent American editor of Dick's works. This editor stated that the Redemption surely was God's most glorious work, that it was the end of all His works, and that it was displayed

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<sup>98</sup>Dick, *Christian Philosopher* (1835), appendix X, 'Strictures on a certain sentiment respecting the work of Human Redemption', p. 342.

<sup>99</sup>Dick, *Future State*, pp. 268-69.

throughout the universe. Rejecting Dick's notion of the afterlife, this editor suggested that the redeemed would chiefly behold, admire, and adore Christ and ponder the mysteries of salvation rather than explore the physical universe or talk with its higher intelligences.<sup>100</sup> Dick never altered his vision of the afterlife, but the offending statement was removed from some subsequent editions of the book in question (whether this was done on Dick's orders or those of his various publishers is not known).<sup>101</sup> His move towards a more orthodox position on the centrality of the cross of Christ in Christianity highlights the Atonement's significance to evangelical audiences.

In writing three tracts twenty years later for the evangelical Religious Tract Society (hereafter RTS), Dick came to place greater stress on the Atonement and the mediating work of Christ.<sup>102</sup> He observed that it was a principle with the RTS 'that every work they publish shall contain as much of the Gospel as may tend to the salvation of the soul'. Agreeing that this principle was 'right and proper',<sup>103</sup> Dick tailored his message to the Society's requirements. He reemphasized that Christian faith depended on revealed theology and personal conversion through the Atonement as well as on studies of the natural world. More forcefully than ever, he declared that conversion had to precede a godly study of nature:

It is sometimes said, as if it were a maxim not to be disputed, that "nature leads us up to nature's God". It is not true. MAN HAS SINNED, and he "will not seek after God", till he knows more than nature, with all its light, can teach him.... MAN HAS SINNED... and before he can know God in nature, so as to delight in him, he must know him in Christ

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<sup>100</sup> *Ibid.*, loc. cit.

<sup>101</sup> The appendix was not present in the tenth edition of his *Christian Philosopher*, published by Collins in Glasgow and London in 1846. It was present in two sets of his *Works* published in America, one by Sumner and Goodman in 1843, the other by Applegate in 1850.

<sup>102</sup> Dick, *Solar System*, I, 40; II, 171.

<sup>103</sup> Dick to Vallack, 23 Feb. 1847, RAS Add MSS 129/10.

as a Father "reconciling the world unto himself".<sup>104</sup>

Dick's commission from the RTS was a manifestation of the increased interest which evangelicals took in science in the 1840s. This was in part a response to the growing availability of secular and radical forms of knowledge to working-class readers. As Jon Topham has suggested, evangelicals increasingly saw those works of natural theology which blended useful knowledge with pious observations as offering a highly attractive alternative to workers.<sup>105</sup> Moreover, as science gained more authority within Victorian culture, there was more incentive for evangelicals to appropriate this authority in the cause of Christianity. And by demonstrating some interest in science, evangelicals were able to assuage or even forestall doubts among the brethren as to its conformity with evangelical tenets.

Of course, evangelicals themselves possessed considerable expertise in science. Men like Dick, David Brewster and Hugh Miller saw science as an ally in their struggle against deists and atheists and used its evidence to defend Biblical authority. Aware that lessons derived from nature were not always simple or clear-cut, they nevertheless confidently shored up the 'holy alliance' (the term is Brewster's) which they had formed between science and evangelical Christianity.

It comes as little surprise, then, that evangelicals considered it a slander when they were criticized for opposing science. In replying to George Combe's 'insinuations, that evangelical religion and the cultivation of science cannot be found in combination', the *United Presbyterian Magazine* proclaimed in 1848 that evangelicalism

embraces in her ranks a multitude of writers who are engaged, through the press, in expounding the phenomena of nature to the popular mind. The publications of Dr Thomas Dick, and many of the works issued by the

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<sup>104</sup> See, for example, Dick, *Telescope & Microscope*, pp. 190-91.

<sup>105</sup> J. Topham, 'Science and Popular Education in the 1830s', 425.

London [Religious] Tract Society... may be taken as illustrations of this last statement.<sup>106</sup>

As we have seen, evangelicals were intensely interested in science, although not strictly for science's sake. Noting how science was 'already mustering a large levy of the superior intellects of the country', the *Free Church Magazine* declared that evangelicals had to focus on inculcating 'a sound and salutary Christian spirit' among these 'young, ardent, and daring minds' who were 'rising to so influential a position in the community'. To do so, ministers had to 'keep abreast' of developments in science, in part to combat heretical uses of science (as seen most notoriously in Robert Chambers's *Vestiges of the Natural History of Creation* in 1844) and primarily to ensure that science would remain 'the handmaid of Christianity'. In this effort, the Free Church established a chair for the study of natural science in its theological college. However, the *Free Church Magazine* disturbingly reported that there yet remained 'a large proportion of our ministers who regard that Chair as unnecessary'.<sup>107</sup>

Thus it was that Dick's lifelong efforts to persuade his fellow evangelicals, not only that a 'holy alliance' existed between science and Christianity but that it also needed to be strengthened, with science given a more prominent role in it, were only partially successful. Evangelicals ended up adopting a range of positions as to precisely how much humans could know about God without the aid of Revelation, with some evangelicals rejecting natural theology in its demonstrative sense as harmful to religious apologetics. Yet Dick's doxological theology of nature proved almost universally popular among evangelicals, who enthused about how it heightened

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<sup>106</sup>Anon., 'Combe's Reply to Kennedy's "Nature and Revelation Harmonious"', *United Presbyterian Magazine*, 2 (1848), 64-68: 66-7.

<sup>107</sup>'The British Association', *The Free Church Magazine*, 6 (Sep. 1850), 257-61: 258.



their awareness of the evidence of Divine grace which existed in them and around them in nature. However, some evangelicals criticized Dick for his attempts to redefine the practice of Christianity and to increase the authority of Christian philosophers like himself within the evangelical community. In the next chapter, the focus is narrowed to three prominent and contentious issues in relations within the 'holy alliance': the plurality of worlds, the nebular hypothesis, and geology. Again, Dick's views on these issues are shown to have been informed and profoundly affected by his particular view of the relationship between evangelicalism and studies of the natural world.

## Chapter 4

### Thomas Dick and the Plurality of Worlds, the Nebular Hypothesis, and Geology

This chapter examines Dick's views on three of the more prominent and controversial issues between science and Christianity in the second quarter of the nineteenth century. Throughout the discussion, the interconnectedness of his science with his evangelicalism is probed. Dick's evangelicalism informed his decisions of what constituted valid, that is, God-sanctioned or God-glorifying, knowledge. Although he himself would have denied the possibility, tensions arose between his science and evangelicalism. This chapter explores these tensions and explicates the methods Dick used, with considerable ingenuity, to eliminate them.

#### 4.1 Thomas Dick, Evangelicalism, and the Plurality of Worlds

Thomas Dick fervently advanced arguments in favour of a plurality of worlds, wherein he had the temerity to include population estimates for the planets (including the rings of Saturn) and even for the universe in its entirety. Michael Crowe has listed Dick's arguments in favour of pluralism, and his list will not be repeated here. Crowe recognized that Dick's arguments were motivated by religious concerns. Yet he tended to dismiss Dick as a fringe figure whose speculations were 'overconfident', 'bizarre' and counterproductive.<sup>1</sup> To characterize Dick's speculations in these terms, however, runs the risk of obscuring the serious theological and emotional purposes which they served for him and his readers. In these related contexts

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<sup>1</sup>M. Crowe, *The Extraterrestrial Life Debate, 1750-1900: The Idea of a Plurality of Worlds from Kant to Lowell* (Cambridge, 1986), pp. 196-202, 556. Paul Baxter also terms Dick's (and Brewster's) theological speculations on pluralism as 'bizarre' and 'much less balanced' than those of Thomas Chalmers and Hugh Miller. See his 'Science and Belief in Scotland, 1805-1868: The Scottish Evangelicals' (Edinburgh Univ. Ph.D. thesis 1985), p. 157.

of evangelicalism and emotional fulfilment, Dick's pronouncements in favour of pluralism were pious, and deliberately extravagant, attempts to explain the purpose of God's creation and to exhibit the natural attributes of God. They also provided reasons to be optimistic in a religion that refused to water down images of humans as 'whitewashed sepulchres'. And they provide the historian with insights into the relationship between evangelicalism and science: if any boundary did exist between them at this time, it was a highly porous one.

As Crowe and S.J. Dick have shown, pluralism's pedigree in Western thought dates back to the ancient Greeks.<sup>2</sup> For Christians, because Scripture did not specifically rule against it, even Biblical literalists could in theory embrace pluralism. In the post-Copernican period, Giordano Bruno (1548-1600) asserted that an omnipotent God had to give physical expression to His boundless glory by creating nothing less than an infinite number of inhabited worlds occupying an infinite universe. Using a teleological approach which Dick and many other pluralists would later adopt, John Wilkins (1614-72) wrote in 1638 that, since God had created mountains on the moon, they 'certainly... were not produced in vaine, and what more probable meaning can wee conceive there should be, than to make that place convenient for habitation'. Wilkins employed the concept of plenitude and the great chain of being to suggest that extraterrestrials filled in the gap between humans and God, an idea which Dick also found attractive.<sup>3</sup> In the eighteenth century, the great majority of natural theologians, including John Ray and William Derham, and Enlightenment philosophers like Immanuel Kant, accepted

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<sup>2</sup> S.J. Dick, *Plurality of Worlds: The Origins of the Extraterrestrial Life Debate from Democritus to Kant* (Cambridge, 1982).

<sup>3</sup> J. Wilkins, *The Discovery of a World in the Moone* (London, 1638; reprinted New York, 1973, intro. by B. Shapiro), p. 138. Also see A.O. Lovejoy, *The Great Chain of Being: A Study of the History of an Idea* (Cambridge, Mass., 1936).

pluralism.<sup>4</sup> William Herschel (1738-1822) famously sought evidence for life on other worlds; he thought it incontestable that the sun was inhabited. Dick was well-read in Herschel, James Ferguson (1710-76), and other leading pluralists of his day.

Dick's rationale for advocating pluralism displayed the paramount influence of religious concerns in his mind. Taking it on faith that matter was inferior to and existed for mind or for life, he observed that 'the material universe was created, and is still preserved in existence, chiefly for the sake of sensitive and intellectual natures, to afford them the means of happiness, and to give them a sensible display of the character and attributes of the Eternal Divinity'. Unpopulated worlds would fail to demonstrate adequately three essential attributes of God: His wisdom, His omnipotence and His benevolence. With respect to wisdom, they would 'exhibit only a stupendous system of means without an end', thus calling into question God's intelligence. With respect to omnipotence, they would hint at the possibility that God's ability to watch over His creatures might have some finite limit. This could lead some to worry unnecessarily that God might be unable to keep His Covenant with humanity.<sup>5</sup> With respect to benevolence, they would be inconsistent with the boundless nature of God's goodness. If 'we would not rob the Divinity of the most distinguishing attribute of his nature [goodness]', Dick declared, 'we must admit that wherever creation extends, his goodness and beneficence are displayed, and, consequently, that intelligent beings of various orders must exist throughout all its amplitudes'.<sup>6</sup>

Dick's belief that life had to exist throughout all amplitudes of the

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<sup>4</sup>M. Crowe, *Extraterrestrial Life Debate*, pp. 9-70.

<sup>5</sup>Dick, *Solar System*, p. 158.

<sup>6</sup>Dick, *Sidereal Heavens*, p. 237.

universe demonstrated his allegiance to the principle of spatial plenitude. This was the idea that matter exists to sustain life; therefore, wherever there is matter, God would express His benevolence and create life there.<sup>7</sup> Yet Dick further defined 'plenitude' in a broader and more theological sense. For Dick, whatever God did and whenever and wherever He acted, He always exhibited all (or the plenitude) of His attributes.<sup>8</sup> He took this idea, I suspect, from A. Baxter's *Matho* (1740). Herein Baxter stated that the unity of the Deity implied that whenever God acted, He exhibited His power, wisdom, goodness, and rectitude together.<sup>9</sup> It followed for Dick, then, that in other solar systems, as in ours, God demonstrated all these attributes by populating these systems. And, following in particular the lead of Johann Lambert, Dick even populated comets, suggesting that we should see them not as harbingers of evil but as splendid worlds which conveyed 'millions of happy beings to survey a new region of the Divine empire... to celebrate in loftier strains the wonders of Omnipotence'.<sup>10</sup>

Dick's unshakable faith in pluralism served further, and crucial, functions in his theology. First, it aided him in theodicy. 'Reasoning from the benevolence of the Deity', he theorized, 'it is more probable to conclude that the inhabitants of our world are almost the only intelligences throughout the universe who have swerved from the path of original rectitude, and

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<sup>7</sup>R.R. Yeo, 'The Principle of Plenitude and Natural Theology in Nineteenth-Century Britain', *BJHS*, 19 (1986), 263-82: 266.

<sup>8</sup>Dick, *Sidereal Heavens*, p. 239.

<sup>9</sup>A. Baxter, *Matho: or, the Cosmotheoria Puerilis, A Dialogue* (London, 1740), pp. 407-08.

<sup>10</sup>Dick, *Sidereal Heavens*, p. 345. On Lambert see S.S. Genuth, 'Devils' Hells and Astronomers' Heavens: Religion, Method, and Popular Culture in Speculations about Life on Comets', in M.J. Nye, et al., *The Invention of Physical Science* (Dordrecht, 1992), pp. 3-26: 12.

violated the moral laws of their Maker'.<sup>11</sup> God had permitted the earth to fall, he surmised, so that 'surrounding worlds may be fully apprized of the dismal effects that must inevitably ensue on every infringement of moral order'.<sup>12</sup> Thus God permitted evil to exist on the earth because it served a greater good for a greater number of planets. Other intelligences took one look at the earth and its depravity and concluded it was far wiser to eschew sin. Thomas Chalmers had pursued a similar line of thought in his *Astronomical Discourses* (1817). He believed Scripture testified 'most clearly and most decisively' that knowledge of our original sin had been 'disseminated amongst [all] other orders of created intelligence....'<sup>13</sup>

Dick shared with Chalmers the idea that pluralism reinforced the evangelical emphasis on the infinite condescension of God in sending His Son to redeem mankind. For Dick and Chalmers, it was that much more astonishing that God cared about humans, when He had so many other beings (most of whom were morally superior to humans) to watch over. These morally superior beings also served as a salutary reminder to benighted humans to exchange their self-conceit for self-diffidence. As Crowe and D. Cairns have suggested, pluralist arguments and imagery were used by evangelicals to engender intense expressions of humility and wonder at God's goodness and power.<sup>14</sup> In short, pluralism produced a more profound piety.

Another religious function served by pluralism was that it made possible more detailed predictions about the physical changes the earth would undergo

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<sup>11</sup> Ibid. (Dick), p. 84.

<sup>12</sup> Dick, *Philosophy of Religion*, p. 296; *Future State*, p. 317.

<sup>13</sup> T. Chalmers, *A Series of Discourses on the Christian Revelation, viewed in connection with the Modern Astronomy* (Glasgow, 1817), p. 144.

<sup>14</sup> M. Crowe, *Extraterrestrial Life Debate*, pp. 182-89; D. Cairns, 'Thomas Chalmers's *Astronomical Discourses*: A Study in Natural Theology', *Scottish Journal of Theology*, 9 (1956), 410-21.

as humans reformed their actions in accordance with Christian morality. As humans adhered more closely to Christ's teachings, Dick predicted they would come to enjoy a never-ending spring, 'basking perpetually in the regions of bliss'. The earth's atmosphere, he suggested, might become similar to nitrous oxide in its tendency to produce laughter, happiness, even unrestrained joy.<sup>15</sup> And, just as an aesthetic revulsion of the results of our moral depravity dissuaded other beings from committing sin, Dick observed, so could an aesthetic appreciation for their morally pure and thus astoundingly beautiful worlds encourage us in our efforts to repent and reform our world.

Dick thought it unquestionable that 'there is but one religion throughout the universe.... I need scarcely say, that the one religion to which I allude, is Christianity'.<sup>16</sup> In fact, here he hazarded a criticism of Chalmers. He claimed that Chalmers, in his *Astronomical Discourses*, had 'deprived himself of an important argument to prove that Christianity is not confined to this sublunary region'. If other worlds were not covered by Christianity's moral code, disastrous disharmony would be evident in the universe, Dick surmised. As no such turmoil was evident, a conclusion which Dick found unsurprising since such evidence would have been inconsistent with a benevolent God, he concluded that 'the spirit and essence' of Christianity 'must be common to all the holy inhabitants of the universe'.<sup>17</sup>

Finally, and crucially, pluralism aided Dick in his efforts to prove the existence of an afterlife. For a 'want of a full conviction of the reality of a future existence', Dick wrote, debauchery and indifference to religion were immeasurably advanced. He sought to supply this want. He wrote that 'in this sublunary sphere there is no scope for the full exercise of the

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<sup>15</sup>Dick, *Philosophy of Religion*, p. 59; *Celestial Scenery*, p. 275.

<sup>16</sup>Dick, *Philosophy of Religion*, pp. 159-61.

<sup>17</sup>*Ibid.*, p. 156.

intellectual powers'. Since a benevolent and wise God clearly would not have endowed us with moral consciences and such powerful and capacious minds without purpose, 'the present world must be only a preparatory scene to a higher state of existence'. In this higher state, or in other words in the afterlife, the redeemed would fulfil their intellectual potential by contemplating and communicating with other worlds and beings, progressively improving their knowledge of the Creator and His universe throughout eternity.<sup>18</sup>

Given that the redeemed would explore the laws, mysteries and marvels of the universe and converse with its occupants in the afterlife, this raised the pedagogical issue of how curricula might best be structured 'to cultivate those dispositions and virtues which will prepare [the faithful] for the enjoyment of celestial bliss'. Certain subjects would manifestly not be needed:

The study of languages--which forms a prominent object of attention with many of those who declaim on the vanity of human science--the study of medicine as a practical art; the study of civil and municipal law; the study of political economy, heraldry and fortification; the arts of the manufacturer, clothier, dyer, &c.--in short, all those arts and sciences which have their foundation in the moral depravity of our nature, will, of course, pass away....<sup>19</sup>

Subjects which it was advantageous to know included arithmetic, mathematics, astronomy, natural philosophy, chemistry, and, to a more limited extent, anatomy and physiology and history. Dick therefore cleverly linked Victorian society's strong belief in and fascination with pluralism to proof of the afterlife and to those pedagogical reforms which played to his strengths.<sup>20</sup>

Along with these theological and pedagogical uses to which Dick put

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<sup>18</sup>Dick, *Future State*, pp. 18, 59-60, 72, 211-45.

<sup>19</sup>*Ibid.*, pp. vii, 250.

<sup>20</sup>J.V. Smith, 'Reason, Revelation and Reform: Thomas Dick of Methven and the "Improvement of Society by the Diffusion of Knowledge"', *History of Education*, 12 (1983), 255-70: 259.



pluralism, he also used it to illustrate more traditional tenets of natural theology. Not only did all bodies in our solar system demonstrate design--a purpose--in his view, but their special arrangements, or what Chalmers termed *collocations*, displayed God's wisdom and benevolence. Crosbie Smith has shown how Chalmers used the idea of collocations to change the thrust of natural theology, from an emphasis on natural laws (which smacked of deism) to an emphasis on the arrangement of the parts of nature, which natural laws, in and of themselves, could not produce. Smith attributed Chalmers's approach to John Robison, Professor of Natural Philosophy at Edinburgh from 1774 to 1805, under whom Chalmers (and Dick) studied.<sup>21</sup> Robison's teachings perhaps also inspired Dick to stress special arrangements as important evidence which showed God's infinite wisdom. In Dick's words, that each planet in our solar system displayed evidence of special arrangements for the enjoyment of intelligent beings 'is a conclusion which is not merely probable, but absolutely certain; for the opposite opinion would rob the Deity of the most distinguishing attribute of his nature, by virtually denying him the perfection of infinite wisdom and intelligence'.<sup>22</sup>

Ultimately, Dick affirmed that Scripture itself unambiguously and authoritatively taught that all worlds were inhabited.<sup>23</sup> Like Brewster after him, he was especially fond of quoting Isaiah 45:18 to the effect that God had not created the earth in vain, that is, that He had created it for life, and therefore by extension He had created all other bodies for life. He liberally sprinkled other, somewhat strained, citations from Scripture throughout his works as if to overwhelm by sheer number the arguments of those

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<sup>21</sup>C. Smith, 'From Design to Dissolution: Thomas Chalmers' Debt to John Robison', *BJHS*, 12 (1979), 59-70.

<sup>22</sup>Dick, *Celestial Scenery*, p. 352.

<sup>23</sup>Dick, *Christian Philosopher* (Philadelphia, 1835), p. 330.

who claimed Scripture was ambiguous or silent on pluralism<sup>24</sup> (or even directly contrary to it, as Thomas Paine had argued famously in his *Age of Reason* in 1793). When one took into consideration all the arguments in favour of pluralism, 'To my own mind', Dick avowed, 'they amount to a moral demonstration; so that I am as fully convinced of the truth of the position we have been maintaining, as if I were transported to the regions of distant worlds, and permitted to mingle in association with their inhabitants'.<sup>25</sup>

But pluralism was not restricted to sober, serious savants: it served a crucial function in making astronomy exciting. Dreams of occupied, living worlds were far more captivating to casual readers than nightmares of desolate, dead ones. 'Without adopting such views [pro-pluralism]', Dick cautioned, 'the science of the heavens becomes a comparatively barren and uninteresting study, and the splendour of the nocturnal sky conveys no ideas of true sublimity and grandeur, nor is it calculated to inspire the soul with sentiments of love and adoration'.<sup>26</sup>

Plurality was not supported merely because it attracted more people to astronomy, however. Rather, its attractiveness drew on a potent mix of the sacred, the spectacular, and the emotionally thrilling and satisfying. To confirm its potency one need only consider the audiences which Chalmers drew to his discourses on astronomy, and the spectacular sales of the book that followed.<sup>27</sup> Serious issues were at stake: if people remained uninspired by astronomy--the most august of the sciences--the moral renovation of humanity could be jeopardized, the millennium might be indefinitely postponed, and an emotionally and spiritually impoverished working class could quite possibly

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<sup>24</sup>Dick, *Sidereal Heavens*, pp. 233, 248-61.

<sup>25</sup>*Ibid.*, p. 247.

<sup>26</sup>Dick, *Celestial Scenery*, p. 362.

<sup>27</sup>M. Crowe, *Extraterrestrial Life Debate*, pp. 184-85.

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A cynic might add that uninspiring astronomy meant fewer books sold and therefore less money earned by Thomas Dick. In this case the cynic would be wrong, since Dick unwisely sold outright to his publisher the copyrights to his books.<sup>28</sup> But the cynic has a point. Dick had a solid grasp on what the public found gripping and exciting. He was especially fond of supplying attention-grabbing statistics, such as seemingly precise estimates of populations on other planets (based on the average population density of England!). In part his imaginative prose was an attempt to render science 'level to the comprehension of general readers' and to make a case for the originality of his work. In advertising his *Celestial Scenery*, for example, he stressed that it introduced a new department of astronomy: 'namely, the scenery of the heavens as exhibited from the surfaces of the different planets and their satellites, which forms an interesting object of contemplation, and, at the same time, a presumptive argument in favour of the doctrine of a plurality of worlds'.<sup>29</sup> More important, however, was his attempt to produce in his readers the same rapture he experienced while contemplating the heavens. Bowled over by the sublimity of the heavens, enchanted by the beauty of celestial scenery, his readers would be motivated to become more pious Christians so that they might experience even more paradisiacal views on a regenerated earth and in the afterlife.

Belief in the plurality of worlds, however, did raise a serious question as to whether other beings in the universe had sinned. If they had, this called into question the universality of Christ's atonement and the uniqueness of God's incarnation in Christ. Dick countered the former by suggesting that

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<sup>28</sup> See chapter six, section two.

<sup>29</sup> M. Crowe, in his *Extraterrestrial Life Debate*, p. 198, suggests Dick was 'hardly innovative' here since Huygens had employed a similar approach a century earlier.

perhaps other beings on a few planets (Mars might be one of them, he hinted) had experienced a similar fall from glory and needed redeeming. But he asserted that most had remained in the pristine state in which God had left the prelapsarian earth. If it could be shown that other planets had indeed fallen, Dick wrote, Christ's redemption would presumably have extended to them. Dick, in short, took a serious but somewhat ad hoc approach to this question. He was content to cite the Bible to the effect that God's ways were sometimes past searching out. However, the uniqueness of the Incarnation he considered, on the basis of Scripture, to be indisputable.

Dick's position on these and other aspects of pluralism can be usefully compared with those of two other evangelical pluralists: Chalmers and Brewster. As we have seen, Chalmers and Dick had both written that the knowledge of humanity's fall had been communicated throughout the universe. However, in contrast to Dick's equivocal suggestion that perhaps other beings had also sinned, Chalmers argued, from Christ's parable of the lost sheep, that among all intelligent beings in the universe only humans had fallen and required Christ's redemption. In his inimitable words,

would it not throw the softening of a most exquisite tenderness over the character of God, should we see him putting forth his every expedient to reclaim to himself those children who had wandered away from him... that, rather than lose the single world which had turned to its own way, he should... lay upon his own Son the burden of its atonement, that he might again smile upon the world, and hold out the sceptre of invitation to all its families?<sup>30</sup>

Thirty-six years later, in his debate on pluralism with William Whewell, Brewster found these words ill-chosen. This assertion, Brewster wrote, 'is one which very few Christians will admit, and one which is opposed to the very system of analogy, which guides us in proving a plurality of worlds'. In its efficacy, Brewster explained, Christ's death on the cross saved all beings in

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<sup>30</sup>T. Chalmers, *Astronomical Discourses*, pp. 102-3.

the universe, who, analogous to man, were probably also sinners.<sup>31</sup>

By suggesting that other beings had sinned and extending Christ's Atonement to them, Brewster's views were similar to Dick's, if more dogmatically expressed. Yet, as John Brooke has observed, for Brewster any difficulties created by pluralism with respect to Christ's Atonement were insignificant compared to those created by the idea that any portion of God's creation lacked purpose. Such a lack would call into question 'the very rationality of the universe'.<sup>32</sup> Dick's attachment to teleology was at least as strong as Brewster's, for he believed that 'Every thing bears the marks of benevolent design, and is calculated to produce happiness in sentient beings'.<sup>33</sup> And, as we have seen, pluralism fulfilled essential functions in his theodicy, his views on the afterlife, and in other areas of his science and evangelicalism.

Dick also shared with Brewster a materialist conception of the afterlife. Like Dick, Brewster expected that 'one of the great joys and glories of heaven would consist in the revelation of all the marvels and mysteries and laws of creation and science by Him by whom "all things were made"'.<sup>34</sup> As John Brooke has noted, 'Belonging to a Protestant tradition in which the resurrection of the body was given more prominence than the immortality of the soul, it seemed to Brewster not unreasonable that in his

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<sup>31</sup>D. Brewster, *More Worlds than One* (London, 1854), pp. 158, 167.

<sup>32</sup>J.H. Brooke, 'Natural Theology and the Plurality of Worlds: Observations on the Brewster-Whewell Debate', *Annals of Science*, 34 (1977), 221-86: 228, 232, 256.

<sup>33</sup>Dick, *Future State*, p. 104.

<sup>34</sup>Sir David Brewster: *His Last Days and Death*. Remarks by Professor Lyon Playfair, Sir James Y. Simpson, and Mr David Stevenson, at the Meeting of the Royal Society of Edinburgh, on the 17th February 1868 (Edinburgh, 1868), pp. 16-17.

future life he would require a material foothold'.<sup>35</sup> This was a fairly common belief. Sir Humphry Davy believed that, after death, deserving human souls would transmigrate 'through different stages of planetary life' carrying with them a 'love of knowledge... which is... in its ultimate and most perfect development... the love of God'. For Brewster and Dick human souls were to be clothed in new, superior physical garments at resurrection, after which they would explore God's universe, perhaps progressing, as in Davy's 'vision', to 'feel the personal presence' of God which humans could now only imagine.<sup>36</sup>

One aspect of William Whewell's essay against pluralism, initially published anonymously in 1853, was its refusal to countenance such materialist visions of the afterlife. Whewell, whose religious views were strongly tinged by evangelicalism,<sup>37</sup> attacked pluralism in part to discredit Robert Chambers's *Vestiges of the Natural History of Creation*,<sup>38</sup> and perhaps primarily because he came to believe it could not be reconciled with key tenets of Christianity, especially the incarnation and redemption.<sup>39</sup> Not

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<sup>35</sup>J. Brooke, 'Natural Theology and the Plurality of Worlds', 257.

<sup>36</sup>Davy articulated his fantastical 'vision' in *Consolations in Travel, or the Last Days of a Philosopher* (London, 1830), esp. pp. 46-59.

<sup>37</sup>J.H. Brooke, 'Indications of a Creator: Whewell as Apologist and Priest', in M. Fisch and S. Schaffer, eds., *William Whewell: A Composite Portrait* (Oxford, 1991), pp. 149-73.

<sup>38</sup>Whewell pointed to man's creation by God 'as an event out of the ordinary course of nature; directly the opposite of the doctrine of the *Vestiges*'. See his *A Dialogue on the Plurality of Worlds; being a Supplement to the Essay on that Subject* (London, 1853), p. 53. Also see M. Crowe, *Extraterrestrial Life Debate*, pp. 265-355; J.H. Brooke, 'Indications of a Creator'; R.R. Yeo, 'Principle of Plenitude', 278; *idem*, 'William Whewell, Natural Theology and the Philosophy of Science in Mid Nineteenth Century Britain', *Annals of Science*, 36 (1979), 493-516; W.C. Heffernan, 'The Singularity of our Inhabited World: William Whewell and A.R. Wallace in Dissent', *Journal of the History of Ideas*, 39 (1978), 81-100.

<sup>39</sup>J. Brooke, 'Natural Theology and the Plurality of Worlds', *passim*; M. Crowe, *Extraterrestrial Life Debate*, pp. 267, 277-81.

all his objections were new: for example, he stated that the earth's barren areas, contrasted with other areas exhibiting wasteful vitality of life, argued against simplistic teleology. Dick had encountered these objections before and had readily explained that barren spots were tangible evidence of humanity's fall from grace. Moreover, reasoning from analogy, the vitality of life which God bestowed on a fallen earth seemed to Dick a further argument in favour of a universe teeming with sensitive, intelligent beings.<sup>40</sup> But Whewell had a more subtle reason than teleology to reject pluralism. Seeking to defend an idealist epistemology based on intuitive mental concepts, he highlighted humanity's unique stature in the universe as rational beings made in God's image. Thus humans shared an enviable 'intellectual empathy' with God which lent support to Whewell's neo-Kantian epistemology.

Whewell's doubts, his resulting acrimonious debate with Brewster, and the outpouring of published replies to both men, however, testified to the contentious nature of pluralism and the seriousness of its implications for God's attributes and humanity's place in the universe.<sup>41</sup> Few commentators on the Brewster-Whewell debate joined Whewell in his denial of pluralism. Fewer still embraced all of Brewster's views on pluralism. Dick himself was, by 1854, an octogenarian who was no longer physically able to update his books; he took no apparent part or interest in the debate. Two contemporary responses, one by a scientist, one by a religious writer, captured the prevailing mood. Pace Brewster and Dick, William S. Jacob, astronomer to the East India Company, wrote that Whewell's arguments were 'valid against the view that any other part of the universe, besides our earth, must necessarily be inhabited, [but] they do not furnish any sufficient ground for maintaining, or considering as probable, that ours was the only spot in the universe

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<sup>40</sup>Dick, *Celestial Scenery*, p. 357.

<sup>41</sup>M. Crowe, *Extraterrestrial Life Debate*, pp. 351-55.

containing intelligent inhabitants'.<sup>42</sup> Edward Higginson, a Unitarian divine and writer of popular commentaries on the Bible, agreed. 'Looking more carefully at the Solar System... the philosophical astro-theologian is far from maintaining that all the bodies which form that system must be, without exception, habitable worlds'. On the other hand, 'Few men at once scientific and religious, probably, doubt the great inference suggested, of the Plurality of Worlds. It has seemed to be the involuntary conclusion of ever-widening science'.<sup>43</sup>

Such cautious affirmations were foreign to the writings of Chalmers, Dick, and Brewster on pluralism. For all three evangelicals, God had to have--paraphrasing Chalmers--exhibited His benevolence by strewing the heavens with inhabited mansions of life and intelligence.<sup>44</sup> But these three men did not agree on the implications arising out of this plenitude of populated planets. Their differences demonstrate that it would be incorrect to suggest there was one evangelical position on the plurality of worlds. For example, all three men quoted Psalm 8:3-5 as supporting pluralism. Yet, whereas Chalmers observed 'It is not for us to say, whether inspiration revealed to the Psalmist the wonders of modern astronomy', Brewster drew the opposite conclusion and stated that these wonders had to have been revealed by God to the psalmist.<sup>45</sup> Dick adhered to the more orthodox position that the Holy Spirit had protected the psalmist from error, and that his passages contained

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<sup>42</sup>W.S. Jacob, *A Few More Words on the Plurality of Worlds* (London, 1855), pp. 33-4.

<sup>43</sup>E. Higginson, *Astro-theology; or, the Religion of Astronomy: Four lectures, in reference to the controversy on the "Plurality of Worlds," as lately sustained between Sir David Brewster and an essayist* (London, 1855), pp. 33-4, 39. Other responses are examined at length by M. Crowe, *Extraterrestrial Life Debate*, pp. 300-53.

<sup>44</sup>T. Chalmers, *Astronomical Discourses*, pp. 41, 100-01.

<sup>45</sup>Chalmers, *Astronomical Discourses*, p. 23; Brewster, *More Worlds than One*, pp. 11-12.



pregnant hints which, because of recent progress in science, we were only now beginning to interpret correctly.

Moreover, not all evangelicals were as enthusiastic as these three in linking pluralism to God's benevolence. Hugh Miller, for example, suggested that the outer planets were inhospitable worlds, suitable places of perdition for the damned to suffer on.<sup>46</sup> Chalmers and Brewster also wavered in their enthusiasm for astronomy. By the 1830s, they saw evidence from geology and the organic sciences--because it was more accessible and involved living phenomena--as being better suited than astronomy to engendering feelings of reverence. Geology also posited dynamic changes, with new epochs being inaugurated by catastrophes followed by re-creations, which offered hope of the final 'catastrophe' spoken of in Scripture when the earth would be burned and purified.<sup>47</sup> Dick, however, never doubted that astronomy was manifestly superior to other branches of science in demonstrating key physical attributes of God, in part because he saw the heavens as teeming with life and as a place of inconceivable dynamic change.<sup>48</sup> Plainly, when addressing aspects of pluralism or of natural theology, evangelicals could disagree with one another, and these disagreements bring into relief the particular nature of their evangelical and scientific beliefs and commitments.<sup>49</sup>

For Dick, pluralism was a means of securing the widest possible audience for astronomy and for stimulating, prolonging and preserving one's rapture for and devotion to God and an appreciation and gratitude for all His blessings.

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<sup>46</sup>P. Baxter, 'Science and Belief in Scotland', p. 153.

<sup>47</sup>*Ibid.*, pp. 111-18.

<sup>48</sup>Baxter observes that, by the 1850s, Brewster had changed his mind and began advocating astronomy as the science best suited to natural theology. Like Dick he seems to have increasingly connected astronomy with a plurality of living worlds and the afterlife. *Ibid.*, p. 152.

<sup>49</sup>J. Brooke, 'Natural Theology and the Plurality of Worlds', 251.

He may also have thought it necessary to stress the grandeur, beauty, and profuseness of life contained in the heavens to counter those who like William Paley (or for that matter Chalmers or Brewster) argued that astronomy was too abstract and less compelling and accessible than the organic sciences. Others may have expressed a Byronic despair at the immensity and apparent desolation of the heavens. But for Dick, astronomy and astro-theology maintained their emotional and spiritual appeal precisely because 'every one of the two thousand four hundred millions of worlds which are comprehended within the range of human vision, has a magnificence and glory peculiar to itself', worlds which he, along with other redeemed souls, would explore in the afterlife.<sup>50</sup>

The emotional and spiritual appeal of pluralism assuredly cannot be emphasized enough. Though Michael Crowe recognized this appeal, he tended to pass judgment on those pluralists like Dick who appeared to partake too heavily of flights of fancy. Yet one must consider how expressions of piety change in different cultures and the audiences for which Dick sung his paeans to pluralism. Pluralism, in the mouths of pious evangelical popularizers like Dick, was conducive to saving souls and to making the path straight to eternal bliss. What was relevant, what was valid, what constituted legitimate knowledge, was what compelled audiences to take up the cross. In Dick's writings, pluralism advanced a conception of God, the universe, and the afterlife which proved immensely popular and reassuring. It was a vision that, once he had consulted all 'relevant' categories of evidence, Dick deemed an incontestable fact.

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<sup>50</sup>Dick, *Future State*, p. 288.

#### 4.2 Thomas Dick, Evangelicalism, and the Nebular Hypothesis

This section further details the inseparability of science and evangelicalism in Dick's thought. Briefly, I argue that Dick supported the nebular hypothesis because it squared with his conceptions of the afterlife, of God's attributes (in particular that He was ever-active, ever-creating), and of progress in society and the universe as a slow but inexorable march towards the coming millennium. His steadfast support for the nebular hypothesis--in face of charges that it led to materialism and assertions by prominent astronomers that all nebulae would prove resolvable by improved telescopes--is inexplicable without reference to the ways in which it strengthened religious convictions he held sacred. This highlights the theory-ladenness and inherent cultural dependence of 'facts' in nature. By retaining his zeal for both pluralism and the nebular hypothesis, Dick also differed markedly from Brewster and Whewell, who each came to reject either one or the other.

The nebular hypothesis arose out of speculations by Pierre Simon Laplace (1749-1827) on the origin of our solar system and the indefatigable efforts of William Herschel to collect and classify nebulae. In his *Exposition du système du monde* (1796), Laplace suggested our solar system had once been a swirling, fiery cloud. Under gravity's influence, this cloud gradually contracted to become the sun. In the process it threw off rings of matter. These coalesced to become planets, which in turn threw off their own rings of matter, which became satellites. Laplace initially cited Saturn's rings and zodiacal light as evidence supporting his theory, adding references to Herschel's model of nebular condensation beginning with the fourth edition of his *Exposition* in 1813.<sup>51</sup> Laplace focused not on cosmology or how the solar

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<sup>51</sup>S. Schaffer, 'The Nebular Hypothesis and the Science of Progress', in J.R. Moore, ed., *History, Humanity, and Evolution: Essays for John C. Greene* (Cambridge, 1989), pp. 131-64: 136; J.H. Brooke, 'Nebular Contraction and the

system developed over time but on cosmogony or how the solar system originated. Explaining this without recourse to God or other metaphysical causes was his primary goal.<sup>52</sup> By the 1820s his theory, together with Herschel's extensive catalogue of nebulous objects, became for some the basis of a mechanism involving the coalescence of nebulae which explained the development or maturation of our solar system and by extension other solar systems in the heavens as well.

By the 1830s, the nebular hypothesis--given this name by Whewell in his *Bridgewater Treatise* on astronomy in 1833--'seemed blessed with the excitement and authority of telescopic astronomy'. It provided a persuasive explanation as to why all planets and their moons (with the disturbing exception of Uranus's) revolved about the Sun in the same orbital plane and direction.<sup>53</sup> Yet it could also be invested with additional, often disturbingly materialistic, meanings. It could simply predict what nebulae were made of, whether they were star clusters or gaseous clouds or a mix of these two. Or it could explain the development of our solar system, either by nebular contraction or some related mechanism. This was sometimes extended to include the formation of other solar systems. More dangerously, it could provide a wholly physical description for the origin and development of life. Finally, in Whewell's sense of a 'fundamental' idea, it could shape how one thought about the universe and through which 'one could construct a seductive, naturalistic account of the history of the universe'.<sup>54</sup>

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Expansion of Naturalism', *BJHS*, 12 (1979), 200-11: 202.

<sup>52</sup> *Ibid.* (Brooke).

<sup>53</sup> S. Schaffer, 'Nebular Hypothesis', p. 132.

<sup>54</sup> The various meanings of the nebular hypothesis are detailed in J.H. Brooke, 'Natural Theology and the Plurality of Worlds', 265-70. Also useful is S.G. Brush's 'The Nebular Hypothesis and the Evolutionary Worldview', *History of Science*, 25 (1987), 245-78.

These different meanings of the nebular hypothesis raised contentious issues in the 1830s and 1840s. As Simon Schaffer has noted, 'The stars gave no unambiguous lesson. Their message was always interpreted to fit the local interests of protagonists in the contests about progress in the Universe and in Society'.<sup>55</sup> One might quibble with Schaffer's use of the word 'always', but he shows how proposals for political reform were linked to progress in the heavens as predicted by the nebular hypothesis. John Pringle Nichol, a Scottish political economist and professor of astronomy at the University of Glasgow, forged such links. He was a radical political journalist and Benthamite reformer who saw the nebular hypothesis as supporting his vision of inevitable, determined, progressive social reform. Nichol was opposed by Thomas Romney Robinson, astronomer in charge of the Armagh Observatory and a Church of Ireland divine. Robinson, reports Schaffer, 'loathed the reformers' uses of the nebular hypothesis, argued that its fate depended on evidence for true nebulosity, and did his best to destroy this evidence'.<sup>56</sup> Disregarding logic and the advice of cooler heads such as George Airy, Robinson touted several apparent resolutions of nebulae accomplished by Lord Rosse's six-foot reflector in Ireland in 1844 as proof that all nebulae would likewise soon be resolved.<sup>57</sup>

In contrast to Nichol and Robinson, Dick did not explicitly link his views on the nebular hypothesis to social or political reforms. But he did link them to a more general axiom as to how God's plans tended to progress gradually towards perfection. For Dick, the nebular hypothesis provided further evidence that progress, at least in the physical world, was best

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<sup>55</sup>S. Schaffer, 'Nebular Hypothesis', p. 136.

<sup>56</sup>*Ibid.*, p. 138.

<sup>57</sup>M.B. Ogilvie, 'Robert Chambers and the Nebular Hypothesis', *BJHS*, 8 (1975), 214-32: 218-19.

obtained by first establishing the proper preconditions and then allowing processes to unfold slowly in obedience to God's commandments.

Differing visions of social progress and political reform were not the sole source of disagreement shaping how astronomers interpreted telescopic evidence for the nebular hypothesis. To avoid serious charges of materialism and atheism, careful distinctions had to be made by supporters of the nebular hypothesis as a theory which described the formation of our solar system. They had to demonstrate that God's sovereignty over His creation and His superintending care and providential concern for humanity were undiminished by this theory. Among those who made such careful distinctions and demonstrations was Thomas Dick.

Of the two men who had laid the groundwork for the nebular hypothesis, Dick had scant respect for Laplace, that 'patron of infidelity'.<sup>58</sup> But he deeply respected William Herschel. Herschel's 'heroic' observations of nebulae, Dick concluded in 1828,

lead to the conclusion, that new systems are gradually forming in the distant regions of the universe. And, if the creating energy of the Omnipotent is at present in constant operation, and has been for ages past, who shall dare to affirm, that it shall ever cease its exertion through all the ages of eternity?<sup>59</sup>

Who indeed? For Dick it was those who opposed the nebular hypothesis who potentially restricted God's sovereignty and power.

This last avowal is crucial. Dick adopted the nebular hypothesis because he believed it provided incontestable proof that God is now--and will continue throughout eternity--creating new systems of worlds. Such proof was

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<sup>58</sup>Dick, *Discoveries of Modern Geology not Inconsistent with Revelation* (Edinburgh, 1842), p. 10. Elsewhere Dick complimented Laplace for his 'beautiful exposition of the Newtonian System' but observed his work was 'glaringly deficient in a reference to the Wisdom and Agency of a Supreme Intelligence'. That of course was precisely Laplace's goal: not to deny God, but to deny the necessity of enlisting God to explain the universe. Dick, *Christian Philosopher* (1835), p. 347.

<sup>59</sup>Dick, *Future State*, p. 329.

crucial to Dick because he believed that, when humans were redeemed in the afterlife, they would chiefly occupy themselves in explorations of God's physical universe. In theory, in their indefinitely long afterlives, and with their enhanced powers, the redeemed might see everything there was to see even in an infinite universe, if it was unchanging. But Dick assured his readers that, with new systems continually being created by God, as demonstrated by Herschel's nebulae, the redeemed would always have fresh manifestations of God's wisdom, benevolence and omnipotence to explore throughout eternity.

Dick's support for the nebular hypothesis was thus strongly influenced, and perhaps even primarily determined, by his religious beliefs. The idea that nebulae were incipient solar systems served to confirm his vision of the afterlife. It also complemented his belief in the plurality of worlds and the moral purity of beings on these worlds. Untainted by humanity's original sin, these morally pure beings were rewarded with the equivalent of ringside seats to the 'stupendous operations' of nebulae being forged into solar systems under God's benevolent and skilled direction.<sup>60</sup>

While depicting, among other aspects, the wonderful vistas which he believed our betters were blissfully admiring, Dick carefully demarcated the explanatory power of the nebular hypothesis:

supposing such physical processes going forward, we must necessarily admit that a direct interference of the Deity is necessary before such worlds, after being organized, can be replenished with inhabitants; for matter and motion, by whatever laws they may be directed cannot be supposed to produce the organization of a plant or an animal, much less of a rational being, whose intellectual principle must be communicated by the immediate "inspiration of the Almighty". To suppose otherwise would be virtually to adopt a species of atheism.<sup>61</sup>

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<sup>60</sup>Dick, *Sidereal Heavens*, p. 187. Dick, like Kant and William Herschel before him, guessed correctly that some nebulae 'are undoubtedly clusters of stars, some of them perhaps containing as many millions as our Milky Way, and occupying a space in the tracts of immensity which imagination can never fathom'. *Ibid.*, p. 188.

<sup>61</sup>*Ibid.*, p. 187, *emph. in orig.*

He thus denied in the strongest terms that the nebular hypothesis could account for the origin of life. Elsewhere, he specified that while nebulae, under the influence of gravity and some form of inertia, coalesced into suns and planets, the resulting solar systems owed their existence and arrangement not to secondary causes but to 'the directing hand of God'. And the gradualness of their formation further confirmed that the Almighty's plans, both in the physical and moral world, tended to progress slowly but inexorably towards perfection.<sup>62</sup>

Dick remained fascinated with nebulae and the purposes they served in the Almighty's plan. His was a thoroughly teleological approach: as J.H. Brooke has observed, in one instance Dick asked what purpose nebulae could possibly serve if they were not incipient solar systems.<sup>63</sup> Yet he himself provided a partial answer to this question in a picturesque passage in his most sober scientific work, his *Practical Astronomy* (1845). For a glimpse into Dick's mind and for evidence of the imaginative appeal of his prose, this passage is worth quoting at length:

What should hinder us from supposing that certain exterior portions of those masses [of luminous matter, the nebulae] form speculums of enormous size, as some parts of our atmosphere are sometimes found to do? Such specula may be conceived to be hundreds and even thousands of miles in diameter, and that they may form images of the most distant objects in the heavens, on a scale of immense magnitude and extent, and which may be reflected, in all their grandeur, to the eyes of intelligences at a vast distance. And, if the organs of vision of such beings, be far superior to ours in acuteness and penetrating power, they may thus be enabled to take a survey of an immense sphere of vision, and to descry magnificent objects at distances the most remote from the sphere they occupy.<sup>64</sup>

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<sup>62</sup>Dick, *Modern Geology*, p. 28.

<sup>63</sup>J. Brooke, 'Natural Theology and the Plurality of Worlds', 270.

<sup>64</sup>Dick, *Practical Astronomer*, p. 121.



There you have it: the ultimate space telescope.<sup>65</sup> Again, Dick's belief in a plurality of worlds inhabited by beings morally, and thus intellectually, superior to man, and his religious certitude that all beings are enjoined by God to seek knowledge of Him through exploring His creation, formed the material out of which he framed his hypotheses in science.

It was a somewhat different motivation, in fact a desire to advance purely secular social reforms, which drove Robert Chambers to publish anonymously his *Vestiges of the Natural History of Creation* in 1844.<sup>66</sup> Chambers employed the nebular hypothesis in its most wide-ranging and thus most dangerous form to account for the origins and development of the universe, solar systems, and life itself. Though Chambers kept God as a divine overseer, the deistic, if not atheistic, tendency of *Vestiges* was clear.

Tarred by Chambers's brush, feathered with nebulae whose bright, gaseous displays had been plucked by Robinson, George Bond and others to reveal only stars hiding behind them, the nebular hypothesis was abandoned by many of its erstwhile supporters. Brewster was one turncoat who joined the anti-nebular posse. His dramatic volte-face was due entirely to *Vestiges*: he was appalled at how the nebular hypothesis could be manipulated to advance materialism and to restrict God's sovereignty.<sup>67</sup> He came to write that it was 'at once presumptuous and fanciful, subversive of every principle of the inductive philosophy, degrading to science, incompatible with religious truth, and

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<sup>65</sup> Perhaps Dick, with his 'aërial reflectors', could conceive such an idea precisely because he was accustomed to using specula which were not fixed in tubes.

<sup>66</sup> J.A. Secord, 'Behind the Veil: Robert Chambers and *Vestiges*', in J. Moore, ed., *History, Humanity and Evolution* (Cambridge, 1989), pp. 165-94; R. Chambers, *Vestiges of the Natural History of Creation and Other Evolutionary Writings*. Edited, with Intro. by J.A. Secord (Chicago, 1994).

<sup>67</sup> P. Baxter, 'Science and Belief in Scotland', pp. 294-97.

dishonouring to the great Author of the material universe'.<sup>68</sup> Whewell, in contrast, continued to accept the nebular hypothesis in its limited sense of describing the formation of our solar system and our's alone. He did so precisely because he saw it as a boon to his efforts to refute Vestiges. For him, the nebular hypothesis, in its limited sense, helped to show that the appearance of intelligent life on the earth was due to divine fiat and not physical laws, as Chambers had asserted. As he refuted Chambers's cosmogony, Whewell came to reject the plurality of worlds, which he thought was a crucial component of Chambers's argument.<sup>69</sup> This touched off his aforementioned duel with Brewster, who like Dick was a zealous proponent of pluralism.

Unlike Brewster and Whewell, Dick did not pen a rejoinder to *Vestiges*. But he almost surely had to have been aware of it. Perhaps he believed he had already refuted it, since in 1832 and at other times he had affirmed that 'To attempt to account for the harmony and order, and the nice adaptations which appear throughout creation, merely from the physical properties of matter, and the laws of motion, is to act on the principles of atheism; and is clearly repugnant to every dictate of reason, which declares, that to every effect we must assign an adequate cause'.<sup>70</sup>

Resolutions of nebulae into stars by astronomers were another matter altogether, however, and these initially gave him pause. He wrote in 1846 that resolutions accomplished by Lord Rosse's telescope suggested the nebular hypothesis 'must now be received with considerable modifications, if not altogether discarded'. Yet in 1850, in an updated edition of *Sidereal Heavens*, he wrote that

we are not to imagine that, in consequence of these discoveries [that

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<sup>68</sup>D. Brewster, *More Worlds than One* (London, 1854), p. 139.

<sup>69</sup>J.H. Brooke, 'Nebular Contraction', 206-7.

<sup>70</sup>Dick, *Improvement of Society*, p. 447.

some nebulae are resolvable], the nebular theory is completely overturned. There are several hundreds of nebulae of all descriptions, and in every diversified form, distributed throughout the heavens, the whole of which cannot be supposed to consist of stars; and therefore we are to consider the late discoveries as only diminishing the number of those bodies which are to be reckoned as pure nebulae, or chaotic matter...<sup>71</sup>

Even Nichol had lost his faith in the nebular hypothesis in 1846 when the Orion Nebula evidently proved resolvable.<sup>72</sup> Yet Dick, with one minor hiccup, refused to sanction the idea that all nebulae would soon suffer Orion's fate. His resolve is attributable to the religious investment which he had made in nebulae as incipient solar systems. As this section has shown, for Dick nebulae were objects worthy of contemplation now and in our future as redeemed saints, shining proof of God's forethought and benevolence. His evangelicalism was inseparable from, and therefore heavily influenced, his science, a state of affairs which persisted as he came to grips with developments in geology.

#### 4.3 Thomas Dick, Evangelicalism, and Geology

The will of that Being therefore is the only limit assigned to its [the universe's] duration; the exercise of that will, the only evidence of a beginning--the only prospect of an end!

David Mackintosh, *Supplement to the Bridgewater Treatises* (1843), p. 29.

Dick did not take a lively interest in practising or studying geology. Yet in his day it was a popular, highly controversial, and even shocking, branch of science. Geologists often quoted John Herschel's claim that their subject ranked, 'in the magnitude and sublimity of the objects of which it treats...in

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<sup>71</sup>Dick, *Christian Philosopher* (1846), p. 309; *Sidereal Heavens* (1850), Appendix 2, pp. 377-78.

<sup>72</sup>Nichol kept the nebular hypothesis to describe how our solar system had evolved, but he abandoned it as a theory to explain the formation of other suns and solar systems. See J.H. Brooke, 'Nebular Contraction', 204.

the scale of the sciences, next to astronomy'.<sup>73</sup> Dick therefore could not and did not overlook it.

In the debate over Genesis and geology, historians have tended to divide evangelicals into 'conservative' and 'moderate' camps. Conservatives were those hidebound Biblical literalists who were sympathetic to Archbishop James Ussher's (1581-1656) calculation that God had created the earth on 6 June 4004 B.C.<sup>74</sup> Here Dean Cockburn's determined if ill-considered attempt to convert the British Association to Mosaic or Scriptural geology in 1844 is well known, as is Adam Sedgwick's reputedly shattering rejoinder.<sup>75</sup> In the 1830s, *The Record*, a Calvinist weekly, tended to support the Scriptural geology of Cockburn, Sharon Turner and Frederick Nolan. However, the evangelical *Christian Observer* consistently supported William Buckland, Adam Sedgwick and other 'moderate' geologists. One might join Boyd Hilton, then, in concluding that 'Moderate evangelicals took a lively and on the whole constructive attitude to geology'.<sup>76</sup>

Dick is to be counted within the moderate camp. As early as 1822, he expressed support for Chalmers's 'gap' or 'interval' theory. This was the idea that there existed a deliberate pause in Genesis between when God created

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<sup>73</sup>For example, Edward Hitchcock repeats Herschel's claim in his *Elementary Geology* (new edn., New York, 1847), p. vi.

<sup>74</sup>J. Morrell and A. Thackray seem to treat all evangelicals as conservative. See their *Gentlemen of Science* (Oxford, 1981), pp. 224-45, esp. pp. 243-44.

<sup>75</sup>T. Cosslett, ed., *Science and Religion in the Nineteenth Century* (Cambridge, 1984), pp. 17-19 provides a useful account.

<sup>76</sup>B. Hilton, *Age of Atonement* (Oxford, 1988), pp. 149-53; N. Rupke, *The Great Chain of History: William Buckland and the English School of Geology* (Oxford, 1983), pp. 14-15; D.A. Young, 'Nineteenth Century Christian Geologists and the Doctrine of Scripture', *Christian Scholar's Review*, 11 (1982), 212-28. Young discusses evangelicals like Miller, John Playfair, and John Fleming who accepted the high antiquity of the earth. Paul Baxter suggests that by the 1840s Scriptural geology was out of favour among most Evangelicals. See his 'Science and Belief in Scotland', pp. 141-44.

the heavens and the earth and when He created light, and that this defined an indefinite period of time in which the changes observed by geologists took place.<sup>77</sup> In the earliest edition (1828) of his *Christian Philosopher* (1823) which I have been able to find, Dick boldly stated that this gap may represent 'a year, a thousand years, or a million of years, just as geological phenomena seem to warrant, without in the least invalidating the authority of the Sacred Historian....' He further calculated that the earth had to be at least 30,000 years old, for this was how long it would take light to travel from the most distant nebulae to the earth. Expressing sympathy for the idea that the fossil record bore witness to catastrophes followed by re-creations of life by God, he affirmed that perhaps as many as 1,400,000 years of earth history had preceded God's creation of humans in Genesis.<sup>78</sup>

Yet despite these affirmations, one can detect considerable caution and unease in Dick's writings. At times, he sounded almost like a Scriptural geologist. Certainly he never wavered in his belief that geology confirmed the Mosaic account of a universal deluge. Moreover, he often warned that geological evidence seemed unusually attractive to sceptics, who twisted it 'to subserve the cause of infidelity'.<sup>79</sup> Fond as he was of making precise calculations for the population of the planets, Dick avoided giving a specific estimate for the earth's age, observing that Scripture tells us 'the earth, in its present form, had no existence at a period seven thousand years beyond the present'.<sup>80</sup> Somewhat equivocally, he suggested his readers peruse Dr. Andrew Ure's *New System of Geology* (1829), a work of Scriptural geology that

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<sup>77</sup>M. Millhauser, 'The Scriptural Geologists: An Episode in the History of Opinion', *Osiris*, 11 (1954), 65-86.

<sup>78</sup>Dick, *Christian Philosopher* (Brookfield, Mass., 1828), pp. 185-87; *Philosophy of Religion*, p. 260.

<sup>79</sup>Dick, *Improvement of Society*, pp. 357-58.

<sup>80</sup>*Ibid.*, p. 349.

supported the traditional estimate of the earth's age of about six thousand years, along with James Parkinson's *Organic Remains of a Former World*. Parkinson, antithetically to Ure, argued for a much older earth and saw the earth's history as a series of catastrophes followed by re-creations of new fauna.<sup>81</sup>

It appears as if Dick was hedging his bets, in part because he believed geology was 'yet in its infancy' and lacked 'a true theory of the earth'.<sup>82</sup> Adopting a Baconian stance, he called for more fact-collecting. It might be best, he suggested, 'to leave to succeeding generations the task of constructing a theory [of the earth] from the materials we thus prepare'. He advised his readers to be patient and to avoid rash deductions. These would lead to 'presumption and folly'. They would also 'damp our ardour in prosecuting the only sure path which leads to discovery, and to frustrate what appears to be one of the designs of the Creator, namely, to grant to the *intelligent inhabitants of our globe a gradual display of his stupendous plans in the universe as the reward of their incessant and unwearied contemplation of his wondrous works*'.<sup>83</sup>

Throughout the 1830s, Dick continued to maintain a cautious and somewhat ambiguous stance. In a list dating from 1835 of recommended authors of works on geology, he cited Ure again, but also Robert Bakewell, John Macculloch, Henry De la Beche, William Buckland, and even Charles Lyell. This list is remarkably heterodox and reads like an outsider's miscellany. Bakewell and

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<sup>81</sup>Ure was George Birkbeck's successor as professor of natural philosophy at the Andersonian Institution in Glasgow. On Ure see C.C. Gillispie, *Genesis and Geology* (Cambridge, Mass., 1951), pp. 118, 152; M. Millhauser, 'Scriptural Geologists', 71, fn 12; W.V. Farrar, 'Andrew Ure, F.R.S., and the Philosophy of Manufactures', *Notes and Records of the Royal Society*, 27 (1973), 299-324: 311-13. On Parkinson see D. Knight, *The Age of Science* (Oxford, 1986), pp. 79-80.

<sup>82</sup>Dick to David Mackintosh, 22 Feb. 1836, NLS MS 584 no. 952.

<sup>83</sup>Dick, *Improvement of Society*, pp. 83-5, 106-7, *emph. in orig.*

De la Beche avoided controversies and were therefore safe choices; Macculloch was 'thoroughly providentialist' in his approach and was therefore also safe, as was Ure.<sup>84</sup> Buckland and especially Lyell were more problematic. Perhaps Buckland was a fairly safe choice. He was Britain's best known geologist, and he had not yet retracted his belief in a universal deluge. More controversial by far was Lyell. In his widely read *Principles of Geology*, Lyell rejected catastrophism and argued against the idea that the earth had progressed through time. As this contradicted Dick's notion of progress, it comes as little surprise that Dick warned his readers that Lyell's work contained 'statements which some will be apt to consider as scarcely consistent with the records of sacred history'.<sup>85</sup> Why did Dick include him, then? Several possible reasons come to mind: Lyell argued vociferously against Lamarck and transformism, his *Principles* must have been in the news, his was the most comprehensive treatise on geology, and he was a fellow Scotsman. Yet I suspect that by including Lyell, Dick was merely striving for completeness.

In his own astronomical works of 1837 and 1840, Dick continued to refer to a cataclysmic and universal Deluge. Meanwhile, in nearly one thousand pages of text he referred only once to his previous conclusion that observations of nebulae suggested that the earth was at least thirty thousand years old. By avoiding contentious questions about the earth's age, Dick in effect allowed his readers to draw their own conclusions.

They did. A young Adam Storey Farrar (1826-1905), later Bampton lecturer in 1862 and canon of Durham, wrote to Dick in 1840 that he found his hypothesis that the continents had originally formed one land mass, which was subsequently 'rent asunder' during the Deluge, quite intriguing (though he

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<sup>84</sup>Here I have followed C.C. Gillispie's descriptions of Bakewell, Macculloch and De la Beche in his *Genesis and Geology*.

<sup>85</sup>Dick, *Mental Illumination*, p. 224.

himself believed the division occurred in the days of Peleg). Such a division, Farrar suggested, 'solves the controverted question, how America was peopled?'. Furthermore, 'it accounts for strata of shells and stones being found there, which are not indigenous... and other things, fossils &c'. This would 'tend to illustrate the Holy Scriptures, and to advance another argument against Scepticism'. These passages, and Farrar's aside that the Deluge was unquestionably universal, 'and not as modern Geologists have dared to say, partial', seem to suggest that he thought Dick was sympathetic to Scriptural geology.<sup>86</sup>

Dick would come to state unambiguously his position in 1842. Answering an invitation which he had received from the Edinburgh Young Men's Society, he prepared a lecture on the 'Discoveries of Modern Geology not Inconsistent with Revelation'.<sup>87</sup> Before he gave his lecture, he received a letter from a friend, James Macara. Macara complained that

The Clergy are not willing to receive any spiritual opening up of the Word - or to admit of any other than what they of their, would be, independent faculties can attain to. We have a further light, which is spreading, and this above all things they wish to suppress & destroy.

This 'further light', which Macara believed he shared with Dick, was spirituality informed by science. Offering Dick his own allegorical reading of Genesis, Macara equated the six days of creation with 'the various stages of regeneration'. Significantly, he confessed that he was unsure what theory Dick would adopt, and he cautioned him that Scriptural geology was no longer tenable, quoting Sedgwick for support.<sup>88</sup>

Macara's letter highlights the tensions which existed between clergy who were for various reasons uncomfortable with science and commentators like Dick

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<sup>86</sup>A.S. Farrar to Dick, 19 Jun. 1840, NLS MS 9658 ff 43-4. Dick's theory of continents is in his *Celestial Scenery*, p. 97.

<sup>87</sup>David B. Cunningham to Dick, 30 Dec. 1841, NLS MS 9658 ff 60 R+V.

<sup>88</sup>James Macara to Dick, 20 Jan. 1842, NLS MS 9658 ff 62-5.



who were comfortable citing evidence from science in the same breath as Scripture. As F.M. Turner has suggested, ministers saw their professional skills and expertise being disregarded or even disparaged, and their professional standing compromised, by those who preferred to cite evidence from science to resolve apparent discrepancies between science and Scripture. They therefore tended to dig in their heels against the increasingly powerful pull of science in Victorian culture.<sup>89</sup>

In 1842 Dick decided the time had come to pull these heel-diggers over to his side. Before, he had quietly suggested that they not make 'an unnecessary concession to the infidel philosopher' in advocating a young earth, which science might soon prove injudicious. He now unequivocally stated that their position was considered 'absolutely untenable, and even absurd, by all the most scientific and respectable geologists of modern times'. He cautioned the young men in his audience that 'We must neither strain the Scriptures to express a certain meaning accordant with our preconceived notions, nor deny the existence of certain facts, because we have never had an opportunity of exploring them, or of understanding the foundation on which they rest'. It was certain, he concluded, that 'the materials of which our globe is composed are of very high antiquity, and were brought into existence long before the race of Adam was placed upon the earth'.<sup>90</sup>

Like others before him, Dick now had to reconcile apparent discrepancies between geology and Genesis. Maintaining his allegiance to the 'gap' theory, he argued that, since no specific period of time was specified for this 'gap' in Genesis, this permitted humans to speculate that 'Ten thousands of years, or even millions of millions of ages may have elapsed since the first portions

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<sup>89</sup>F.M. Turner, 'The Victorian Conflict between Science and Religion: A Professional Dimension', *Isis*, 69 (1978), 356-76.

<sup>90</sup>Dick, *Modern Geology*, pp. 20, 6, 17, in that order. Emph. in orig.

of matter were created'. These 'millions of millions of ages' represented a significant expansion of time from his previous estimates. Yet he asserted that this only 'expand[ed] our conceptions of the plans and operations of the Deity', and was more consistent with Psalm 102:25 (to the effect that God had 'of old' laid the earth's foundation). Besides, when compared with the eternal lives granted by God to the redeemed, 'millions of ages dwindle into a moment'. The very fact that Moses 'specifies no definite period as the commencement of the material creation--I consider as a corroborative argument for the truth of divine revelation', Dick boldly declared.<sup>91</sup>

The specifics of Dick's geology were by this time unremarkable. He saw evidence of four or five epochs of destruction and subsequent re-creations of life by God. Each re-creation represented an improvement, with God 'gradually fitting up this world for the ultimate residence of moral and intellectual beings' by 'the agency of those physical laws which he had impressed upon the elementary principles of the material universe'. These re-creations offered additional proof of God's law of progression, 'which pervades both the intellectual and the corporeal universe' as well as the moral world.<sup>92</sup> Such re-creations also helped keep atheists and deists at bay. Dick, like Buckland and Sedgwick, saw 'the clearest evidence of an all-wise and superintending Providence' intervening to create new life amid the catastrophes to which the earth's surface had been subjected.<sup>93</sup> But unlike Buckland, who had quietly retracted his belief in a universal deluge in a footnote in his *Bridgewater Treatise* of 1836, Dick continued to refer to diluvial deposits and a universal deluge. Interestingly, he failed to mention Buckland or Lyell in his lecture. Instead, he cited Sedgwick and Charles Babbage's *Ninth Bridgewater Treatise*

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<sup>91</sup> *Ibid.*, pp. 22-23, 25.

<sup>92</sup> *Ibid.*, pp. 18, 28-9, 33. *Emph. in orig.*

<sup>93</sup> N. Rupke, *Great Chain of History*, p. 247.

(to the effect that the tertiary series was probably formed over millions of years). Perhaps most originally, he speculated that the earth might once have been the home of superior intelligences, whom God had removed long before our appearance.<sup>94</sup>

Ultimately, Dick intended his lecture on geology as a corrective to those infidels who used geology to attack the divine status of Scripture, to those who advanced notions that humans were created at a more remote point in time than Biblical chronology indicated, and to those Scriptural geologists who distrusted the progress of science. Of the last group, he failed to convince a certain James Laurie, who cited Matthew 19:4-5 in support of the traditional reading that 'In the beginning' marked not a long pause but the commencement of the six days of creation. Laurie affirmed that, if his reading was correct (he knew it to be so), 'Dr J[ohn] P[ye] Smith, and all others who would, with you, pervert the Mosaic history from its plain and obvious meaning, must yield to what you will all admit to be the very highest authority, & concede the point in dispute'. Unfortunately, Dick's reply is not extant, but he never conceded the point.<sup>95</sup>

Dick's limited legacy of grappling with geology raises some interesting points. First, it must be admitted that, compared with astronomy, geology was of minor interest and importance to him. His lecture demonstrated this. In its use of minerals instead of specific fossils to classify strata, it was obsolete, and it also contained obvious contradictions. In one instance, Dick claimed that the secondary rocks contained bones of animals still living, then three pages later he claimed that, of all the known fossil species in these rocks, none remained alive today.<sup>96</sup> Second, while he believed that 'true'

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<sup>94</sup>Dick, *Modern Geology*, pp. 35, 13, 17, in that order.

<sup>95</sup>James Laurie to Dick, 19 July 1842, NLS MS 9658 ff 70-1.

<sup>96</sup>Dick, *Modern Geology*, pp. 12, 15.

geology would only serve to corroborate Genesis, its evidence was not needed by Christians. Far more compelling confirmation--miracles performed, prophecies fulfilled, historical documents, the manifest superiority of Christianity's moral code--existed for Christians, Dick affirmed. Geology, in other words, fulfilled no essential apologetic function for Dick. Third, geology provided yet another example of progressive improvement towards perfection. This for Dick was 'a characteristic of the plans of the Almighty'. Similar progress, but of vastly deeper import to humanity, was being demonstrated in the moral world. In particular, missionaries were spreading the gospel to other lands. For Christians this was the progress that truly mattered, the progress which would lead to the onset of the millennium.<sup>97</sup>

Sharing Dick's millennial hopes and moral thrust was Hugh Miller, who from the humble origins of a stonemason rose to become a giant of Victorian geology through his skill with a hammer and pen. Miller's method of harmonizing geology with Genesis, however, was far more complex and idiosyncratic than Dick's. Whereas Dick had specifically rejected the 'day-age' approach to reconciling geology with Genesis, declaring that he could 'see no reason for deviating from the common acceptation of the word day as expressing a period of twenty-four hours',<sup>98</sup> Miller embraced it. He felt that the 'gap' theory had been rendered untenable due to the continuing lack of evidence for the catastrophe which, by this theory, would have had to precede God's creation of man.<sup>99</sup>

Interestingly, both men agreed that the sequence of events in the Genesis creation story described how these events would have appeared to an

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<sup>97</sup> *Ibid.*, pp. 28-29, 34.

<sup>98</sup> *Ibid.*, pp. 32-3.

<sup>99</sup> P. Baxter, 'Science and Belief', p. 139.

imaginary human observer stationed on the earth. Reading Genesis closely, one might conclude that God had not created the sun, moon and stars until the fourth day. Yet Dick surmised that for this imaginary human observer, the sun, moon and stars had been obscured during the first three days by 'a dense mass of mingled air and vapour'. God had then swept away these dense vapours on the fourth day, revealing the sun, moon and stars. It would appear to this observer 'as if they had been but newly created', but in reality God had created them countless millennia ago.<sup>100</sup> Genesis, in other words, had been written in a language of appearances which God had judged best suited to the limited knowledge of humans living in the time of Moses.<sup>101</sup>

Writing after Chambers published *Vestiges*, Miller had to formulate his theory in a stormier climate than Dick had had to weather in the early 1840s. He was particularly keen to refute Chambers's deistic theory of development. In Miller's scheme of harmonization, the six days corresponded to epochs of indeterminate length. Only three of these 'days' were of immediate relevance to, and explicable by, geology. At the beginning of these epochs, God had intervened to create the appropriate forms of life for each, which thereafter tended to degenerate rather than to develop. Across epochs, however, one could perceive progress in the fossil record. For Miller, degradation in nature and a certain measure of nature red in tooth and claw befitted the character of depraved humans and a righteous God. His theory negated entirely any deistic 'development' hypotheses or theories of transmutation.<sup>102</sup>

Miller and Dick shared a similar agenda in that they both sought to protect the authority of Revelation and to deny that life originated or

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<sup>100</sup>Dick, *Modern Geology*, p. 32.

<sup>101</sup>D.A. Young describes this as an 'optical' language in his 'Nineteenth century Christian Geologists', 222.

<sup>102</sup>H. Miller, *The Testimony of the Rocks* (Boston, 1857).

developed independently of God. This in itself is not remarkable. More unusual is how their evangelical beliefs shaped the content of their geological theories. For both men the geological record demonstrated progress which led inevitably to God's creation of Adam and Eve. Yet there was an important difference in how they visualized this progress. Dick saw it as God's hand gradually fitting up the earth for human occupation. Before He created humans, God created inferior plants and animals 'in order that matter might not exist in vain'.<sup>103</sup> Miller saw progress contained within the fossil record itself. His was more an idealist or transcendental vision which owed much to the comparative anatomy of Richard Owen.

Both Dick and Miller believed that geology taught important theological lessons. For Dick, that portions of the earth's surface continued to remain desolate and disordered was not attributable to a lack of wisdom on God's part. Rather, it was evidence of His punishment for humanity's original sin. Once humans regenerated their moral lives in accordance with God's laws, He would restore the earth to its prelapsarian perfection, and humans would once again walk with Him in paradise. For Miller, geology showed that humans were created 'just ere the close of that sixth day', and that God's sabbath or seventh day was still ongoing. Yet, whereas for Miller God had stopped creating with humans, His masterwork, for Dick God was still busy creating new worlds and intelligences. They both agreed that humanity's ultimate destiny was moral elevation and final redemption, consummated by the arrival of Christ's dynasty.<sup>104</sup> And they both drew lessons from geology which they believed presaged and helped to advance the coming millennium. It is with this that perhaps we can usefully identify them as practising 'evangelical' geology.

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<sup>103</sup>Dick, *Modern Geology*, p. 18.

<sup>104</sup>Miller, *Testimony*, pp. 103-4, 171, 176-8, 210.

## Chapter 5

### The Aesthetic and Socio-Political Dimensions of Dick's Writings

[T]he most noble and honourable operation in which love can be engaged, is to devise and execute schemes by which our degraded brethren may be raised to intellectual and moral excellence; to train up young immortals in religion and virtue; to diffuse the principles of useful knowledge among all ranks; to counteract the diabolical spirit of war and contention; to abolish slavery in every shape; to ameliorate the social and domestic condition of the lower orders of society; to publish the revelation of God in every language, and to send forth the messengers of salvation to every land...

Thomas Dick, *The Philosophy of Religion* (1826), p. 127

This chapter examines the aesthetic and socio-political dimensions of Dick's writings. In section one, I show that Dick employed aesthetic representations of nature in an attempt to invigorate proper moral and religious sentiment among all orders of society. An ability to appreciate nature's aesthetic qualities is not commonly associated with evangelicals, which is precisely why this topic deserves to be privileged. Section two details the socio-political aspects of Dick's philosophy of education and his participation in mechanics' institutes. It is argued that Dick was not primarily seeking to control the behaviour of the working classes; rather, he wanted to reform all orders of society in preparation for the millennium. Section three examines the specific social reforms which Dick advocated and compares them to the social agendas of other middle-class reformers, particularly that of the phrenologist, deist and anti-evangelical George Combe. Despite their radically different agendas, Dick's and Combe's social visions, it is suggested, exhibited surprising affinities.

### 5.1 Dick, Evangelicals and the Aesthetic Appreciation of Nature

I was likewise led, in early life to a relish for such [astronomical] studies, from an impression that the sublimity of the nocturnal sky made upon my mind, and from the wonderful reports made by astronomers of the distances and magnitudes of the orbs of heaven. Without saying too much of a favourite study, it may be asserted with truth, that there is no science which presents to the mind so many magnificent and sublime conceptions, or leads to more expansive views of the perfections of the Great Creator and Redeemer of men.<sup>1</sup>

Throughout most of the nineteenth century, an aesthetic appreciation of nature was intrinsically attractive to evangelicals. Transfixed and transformed by God's grace, emotionally overwhelmed by rapturous conversions, evangelicals were perhaps predisposed to be sympathetic to arguments urging them to revel in the beauty and grandeur of God's creation. Averse to pleasures in which many of their countrymen indulged--alcohol, blood sports, reading novels,<sup>2</sup> dancing, even hymns, ornate churches, and elaborate forms of worship--they could nevertheless give their assent to aesthetic, but not overly enthusiastic, appeals to nature. Perhaps suffering from an impoverishment of beauty, and with the Bible as a sufficient source of literary beauty, nature could be invoked to provide them a source of aesthetic pleasure. As the evangelical *Free Church Magazine* observed, aesthetic appreciation of nature was upheld by the very Word of God, wherein were made 'repeated appeals to the beauty of the material universe'. Evangelicals, therefore, were duty-bound to cultivate it, for without it 'the soul cannot be in complete harmony with Christ'.<sup>3</sup>

Thus it was that evoking an aesthetic response within a devotional

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<sup>1</sup>Dick to Vallack, 12 Oct. 1840, RAS Add MSS 129/8.

<sup>2</sup>On evangelical attitudes towards fiction see D. Rosman, *Evangelicals and Culture* (London, 1984), pp. 184-93; V. Cunningham, *Everywhere Spoken Against: Dissent in the Victorian Novel* (Oxford, 1975), pp. 49, 54.

<sup>3</sup>Anon., 'The British Association', *The Free Church Magazine*, 8 (1850), 257-61: 259.



context through a passionate study of nature was considered by evangelicals to be equal, if not superior, in importance to demonstrating from nature God's existence and His attributes.<sup>4</sup> In this context, as John Brooke has observed, Hume's and Kant's critiques of the demonstrative function of arguments from design were beside the point. By participating passionately in a study of nature, one was rewarded with heightened sensitivity to God's presence and a deeper appreciation for the debt one owed Him. Such sensitivity was a commonplace in literary works of the day and was well demonstrated by Charlotte Brontë's *Jane Eyre*:

We know that God is everywhere; but certainly we feel His presence most when His works are on the grandest scale spread before us: and it is the unclouded night-sky, where His worlds wheel their silent course, that we read clearest His infinitude, His omnipotence, His omnipresence.... Looking up, I, with tear-dimmed eyes, saw the mighty Milky-way. Remembering what it was--what countless systems there swept space like a soft trace of light--I felt the might and strength of God. Sure was I of His efficiency to save what He had made: convinced I grew that neither earth should perish, nor one of the souls it treasured.<sup>5</sup>

Hungry, cold and alone, Jane Eyre drew great sustaining power from contemplating the heavens, seeing even with her untrained eyes that her existence was sponsored, guarded and guaranteed by God.

That the study of the heavens necessarily overpowered the mind, leaving one in Jane Eyre's state of speechless wonder, and leading one 'irresistibly' to contemplate God, was of no surprise to Dick. Few evangelicals displayed more confidence in the aesthetic power of nature than he. Nature for him was not cold and mechanistic but exhilarating and alluring, the creation of an

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<sup>4</sup>J.H. Brooke, 'Indications of a Creator: Whewell as Apologist and Priest', 167-68. See also W.H. Brock, 'Notes and Discussions. Humboldt and the British: A Note on the Character of British Science', *Annals of Science*, 50 (1993), 365-72; J.L. Richards, 'God, Truth, and Mathematics in Nineteenth Century England', in M.J. Nye et al., eds., *The Invention of Physical Science: Intersections of Mathematics, Theology and Natural Philosophy since the Seventeenth Century* (Dordrecht, 1992), pp. 51-78: 55-61.

<sup>5</sup>C. Brontë, *Jane Eyre* (1847), in the *Complete Novels of Charlotte & Emily Brontë* (Glasgow, 1993), p. 237.

Artist of incomparable skill and goodness Who rendered 'every scene of nature subservient to our convenience and delight'. The midnight scene alone, Dick fervently wrote,

inspires the soul with a solemn awe, and with reverential emotions; it excites astonishment, admiration and wonder, and has a tendency to enkindle the fire of devotion, and to raise the affections to that ineffable Being who presides in high authority over all the movements of the universe.<sup>6</sup>

A few utterly depraved souls might remain uninspired by nature, Dick admitted, but God's chosen most certainly would be inspired.

Potential pitfalls lay concealed within such spectacular scenes, however. Philosophers like Kant had cautioned that such scenes might produce unsound moral states analogous to those produced by superstitious beliefs.<sup>7</sup> Aesthetic appreciation, the *Free Church Magazine* warned its readers, could also serve as a refuge for pantheists, who confounded the Creator with His works, and denied 'the one living and true God'. Evangelicals were not to quail when faced by these dangers, however. Rather, they were advised to embrace aesthetics, not only to enjoy 'all the pleasure which a just and refined appreciation of these things is fitted to inspire', but also to show pantheists that it was through Christianity that one most powerfully experienced God's presence in nature, 'hold[ing] communion with Him who loved them, and who washed them from their sins in His own blood'.<sup>8</sup>

In their aesthetic enjoyment of nature, Dick and his fellow evangelicals remind us that the 'Romantic movement' in Britain, usually dated from 1780 to 1830 and centred on William Wordsworth, was more pervasive than one might at

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<sup>6</sup>Dick, *Solar System*, p. x.

<sup>7</sup>S. Schaffer, 'Natural Philosophy and Public Spectacle', 31-34.

<sup>8</sup>'The British Association', *The Free Church Magazine*, 259.

first imagine.<sup>9</sup> Many shared the Romantics' propensity for playing up the poetic, the visually and imaginatively stimulating, and the alluring features of nature. Indeed, leading savants like Whewell and John Herschel shared in the 'Romantic' response to nature, even composing their own poetry.<sup>10</sup> Dick himself was fond of quoting poetry. Yet he argued that one should commune directly with nature, not with poets, to experience aesthetic pleasures at their keenest:

Is a person gratified at beholding symmetry and beauty as displayed in the works of art,--what a high degree of delightful emotion must be felt in surveying the beautiful arrangements of Infinite Wisdom...[in nature]! Has he a taste for the sublime? How nobly is he gratified by an enlightened view of the nocturnal heavens, where suns unnumbered shine, and mighty worlds run their solemn rounds!<sup>11</sup>

For Dick, evidence from nature was 'calculated to produce emotions of wonder and delight even superior to those excited by the most highly wrought tales of fiction and romance'.<sup>12</sup> Human representations would always be as shadow plays to nature's own dramatic and poetic performances. David Mackintosh, a prominent itinerant lecturer who had been inspired by Dick's writings to pursue science, concurred with this sentiment. He affirmed that his lectures were meant 'to show that the noblest field for the exercise of poetic emotion, lies in the revolutions of the works of the Creator'.<sup>13</sup>

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<sup>9</sup>Literature on the Romantic movement is voluminous. R. Christiansen's *Romantic Affinities: Portraits from an Age 1780-1830* (New York, 1988), captures the spirit of the movement and provides a useful introduction. See also A. Cunningham and N. Jardine, eds., *Romanticism and the Sciences* (Cambridge, 1990).

<sup>10</sup>S.S. Schweber, 'Scientists as Intellectuals: The Early Victorians', in J. Paradis and T. Postlewait, eds., *Victorian Science and Victorian Values: Literary Perspectives* (New Brunswick, N.J., 1985), pp. 1-37: 18.

<sup>11</sup>Dick, *Improvement of Society*, pp. 145-46.

<sup>12</sup>*Ibid.*, p. 123.

<sup>13</sup>D. Mackintosh, *Supplement to the Bridgewater Treatises. The Highest Generalizations in Geology and Astronomy, viewed as illustrating the Greatness of the Creator*. 2d ed. (London, 1843), p. 4. On Mackintosh's lecturing see I. Inkster, 'Science and the Mechanics' Institutes, 1820-1850: The Case of

What were the sources for Dick's fervent faith in nature's aesthetic power? His formative childhood experience with the meteor almost certainly was one source. Transfixed, then terrified, then relieved that the world had not yet been set on fire by God, Dick's life was transformed. In his mind's eye, this meteor left little room for doubt. Elated that he had witnessed such an awe-inspiring display of God's omnipotence, he relived this experience through his writings and sought to transfer its power to his readers. Here was an emotionally overwhelming event with which evangelicals could identify. It must be remembered that belief was not primarily an intellectual matter for most evangelicals. It was more an expression of an all-embracing devotion to God wherein shared aesthetic experience could play a crucial role. Dick was an inveterate promoter of aesthetic pleasure because from his youth the radiance of the heavens had been for him a constant source of astonishment and unwearying joy.

A second and related source of his faith in aesthetics was simple piety. But piety takes faith, and faith takes practice. Part of the essence of practising faith for Dick was bearing witness to God's presence everywhere in nature and seeking to glorify Him in all things. Souls sensitive to the sacred suitably showed their piety by standing spellbound--enraptured and chastened--in the grandeur that was the Almighty's temple of nature. This was not emotional gratification or intellectual satisfaction substituting for piety. Rather, it was part and parcel of piety, for there were direct Scriptural injunctions to celebrate and revel in nature's wonders. He who contemplates 'the wonders of the heavens in their true light, and who does not find his views of the Creator expanded and his religious emotions elevated by such studies, has reason to call in question the nature and the sincerity of

his devotional feelings', Dick avowed.<sup>14</sup>

It was precisely such an aesthetic sentiment that played so influential a role in Dick's belief in a plurality of worlds. In his view, God had intended that a plurality of worlds would 'make a sublime and reverential impression' on all intelligent minds. One could then take this impression and read the Bible in a new way, bringing into relief the 'import and sublimity' of passages of Scripture which otherwise would have remained indistinct.<sup>15</sup> A universe devoid of other forms of life, however, would convey a woefully inadequate idea of the sublimity of God's creation. It would fail to inspire the soul with sentiments of love and adoration. It would, in short, fail to engender appropriate expressions of piety. As we have seen, Dick believed humans were depraved creatures, and he often expressed his dismay and disgust at the sheer waste and viciousness revealed by even a cursory reading of human history. In a celestial vault crowded with worlds populated by superior intelligences he could hardly have chosen a larger physical object to reveal to humans their minuteness and benightedness.

A third source from which Dick drew his faith in aesthetics was twenty years' practical experience as a schoolmaster. Children, he became convinced, were endowed by God with a principle of curiosity and a desire for novelty. What captivated them were not dry and mostly incomprehensible lessons in Latin but stirring encounters with the wonders and curiosities of nature. Thus the texts best calculated to stimulate their God-given endowments were not the classics, tainted as they were by references to pagan gods and paeans to war. Stories of nature's wonders infused with references to God--and employing words young children understood--were the texts which children needed to read.

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<sup>14</sup>Dick, *Christian Philosopher*, I, 23, fn.

<sup>15</sup>Dick, *Christian Philosopher*, I, 51-53.

Here Dick was especially fond of Andrew Baxter's *Matho* (1740).<sup>16</sup> This was a dialogue which showed how one inquisitive boy--the eponymous 'Matho'--developed a deep appreciation for God's existence and attributes through contemplating nature. Examining a simple diagram of the solar system, Matho exclaimed: 'How pleasant must the intelligent Contemplation of these Things be, when the bare hearing of them, and looking on this Diagram, throws me into such an Extasy of Wonder and Delight!'.<sup>17</sup> One might assume, from Dick's calls for this book to be reprinted, that Matho was his ideal of the perfect student.<sup>18</sup> With other Mathos in mind, Dick called repeatedly for more imaginative approaches to education which would incorporate inspiring scenes from nature to instil virtue and lead youth to rejoice in the physical manifestations of God's magnificence.

Finally, a source which should not be overlooked is the beauty and sublimity of Dick's own physical surroundings in Broughty Ferry. Deliberately building his house in an isolated spot on a hill, he must have enjoyed majestically dark skies for his astronomical observations. His 'prophet-chamber' had a commanding view over the Firth of Tay,<sup>19</sup> with fleets of sailing ships bobbing on the waves plying the jute trade. On clear days the sunrises must have been breathtaking.

With the sources of Dick's faith in aesthetics delineated, we may now turn with profit to the uses to which he put his aesthetic theology of nature.

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<sup>16</sup>A. Baxter, *Matho: or, the Cosmotheoria Puerilis, A Dialogue. In which the First Principles of Philosophy and Astronomy are Accomodated to the Capacity of Young Persons, or such as have yet no Tincture of these Sciences. Hence the Principles of Natural Religion are Deduced* (London, 1740).

<sup>17</sup>*Ibid.*, p. 95.

<sup>18</sup>See *Christian Philosopher*, II, Appendix 13, 'List of Popular Works on the different Sciences', p. 331.

<sup>19</sup>My thanks to Russell and Susan Meek, the present owners of Dick's house, for inviting my wife and me in, serving us tea, and allowing us to share their lovely view of the Firth of Tay.

Quite simply, by appealing to the curiosity of his readers and to a gentleman's modest interest in science, he tried to generate enthusiasm for the study of nature. Through depicting the tremblingly sacred awareness which he shared with the Biblical psalmist as he contemplated the grandeur of the heavens, he demonstrated that science was morally enhancing. It was, in a word, pious pleasure. One could satisfy one's inquisitiveness and experience inexpressible joys while studying God's creation. And, because the heavens were accessible even to those who were destitute and illiterate, even the humblest of people could participate in the Divine and share in equal measure the reverential awe felt by their putative superiors.

Discovering and depicting sublime and beautiful features in God's creation, moreover, was an outlet for authorial creativity. Lynn Merrill has shown how mid-Victorian natural history was embedded in a discourse of wonder.<sup>20</sup> Popular natural history writers like Charles Kingsley and Hugh Miller, she observes, combined natural facts with emotional appeals in affective, colourful and evocative prose. Celebrating the 'poet's way' of responding to nature, they spoke directly to their readers, sharing the pleasure of discovery with them and including them in a community of wonder.

Fond of quoting the Scottish poet-minister James Thomson's effusions on nature,<sup>21</sup> Dick showed in his own prose a sense for the thrilling and revealed his own emotional involvement in nature. One 'New Generation' poet has rightly labelled some of Dick's more speculative and imaginative passages 'found poems'.<sup>22</sup> The following passage, which discusses the possibility of

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<sup>20</sup> L.L. Merrill, *The Romance of Victorian Natural History* (Oxford, 1989).

<sup>21</sup> On Thomson see A.L. Drummond and J. Bulloch, *The Scottish Church 1688-1843*, pp. 89-90.

<sup>22</sup> W.N. Herbert, *The Testament of the Reverend Thomas Dick* (Todmorden, Lancashire, 1994), pp. 77, 82. See also *idem*, 'God's Astronomer: The Peculiar Universe of the Reverend Thomas Dick', in Herbert and R. Price, eds., *Duende: A Dundee Anthology* (Dundee, 1991), pp. 49-61.

other planetary systems in the universe, is an especially fine example:

Around some of those worlds there may be thrown not only two concentric rings, but rings standing at right angles to each other; yea, for aught we know, there may be an indefinite number of rings around some worlds, and variously inclined to each other, so that the planet may appear like a terrestrial globe suspended in the middle of an armillary sphere; and all those rings may be revolving within and around each other in various directions and in different periods of time, so as to produce a variety and sublimity of aspect of which we can form no adequate conception.<sup>23</sup>

Dick saved his most extravagant suppositions for speculations about the 'throne of God' as mentioned in Isaiah. This throne, about which Dick suggested perhaps all galaxies revolve, was 'the most sublime and magnificent idea that can possibly enter into the mind of man'. '[It] may bear as great a proportion, in point of magnitude, to the universal assemblage of systems, as the sun does to his surrounding planets', he continued. 'It is impossible for the human mind to form too extravagant ideas of the universe, or to conceive its structure to be more glorious and magnificent than it really is', Dick rapturously concluded.<sup>24</sup>

Here was an aesthetic vision framed to penetrate and excite the souls of his readers. It was subjected to evangelical concerns, communicated evangelical values, and satisfied evangelical cravings for participation in the Divine. Yet, in the sublime feelings of awe, ecstasy and wonder which it inspired, and in the way in which these feelings served to corroborate and strengthen faith and to stimulate strong emotional compulsion to further worship God, this vision also had a broad, non-denominational appeal. A love of beauty and the sublime was an undogmatic and non-sectarian expression of reverence to God and His creation which virtually all Christians could countenance. In fact Dick seemed to suggest that, when considered apart from each other, it was aesthetic appreciation, and not reason, which humans found

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<sup>23</sup>Dick, *Celestial Scenery*, p. 180.

<sup>24</sup>Dick, *Future State*, pp. 331-34.



more persuasive. The itinerant lecturer David Mackintosh was persuaded by Dick. He mused:

Delightful contemplation--to think that vast as is the system of creation, I form a part of that system, and am at this instant performing the tour of space, along with my parent cluster, and rendering homage to my Maker by revolving round His throne.<sup>25</sup>

It is of course true that science and religion are major cultural forces; a synergistic fusion of the two with an aesthetic emphasis can therefore have explosive power.<sup>26</sup> How adventurous a study of the heavens could prove. Suitably enraptured and chastened by God's glory as revealed in the heavens, humans would return to the piety and brotherly love which God expected of them. They would pledge their allegiance not to any one sect or to abstruse theological doctrines but to the true Christian message reflected in Christ's two great commandments. Needed social, economic, and religious reforms would follow as this new spirit of love, operating like gravity, permeated humanity and drew people of all creeds and classes together.

For Dick the latter function was crucial. Aesthetic appreciation, he believed, could play a key social role in soothing workers' resentments. Writing in the early 1830s, years of unusually acute social stress in Britain, Dick preached that a worker need not envy the wealth and fine possessions of his betters. Why should he, when 'the magnificence and glories of the universe, and all the beauties of terrestrial nature lie before him.... [in them] he can enjoy a satisfaction and delight which the wealth of this world cannot bestow, and which its frowns and calamities cannot destroy'. An appreciation for nature's wonders, to be cultivated in part through adult education, served to 'undermine those envious and discontented dispositions

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<sup>25</sup>D. Mackintosh, *Supplement to the Bridgewater Treatises*, p. 31.

<sup>26</sup>As Dick put it, 'to amalgamate... the arts and sciences... with Divine subjects, is to consecrate them to their original and legitimate ends, and to present religion to the eyes of men in its most sublime and comprehensive and attractive form....' See his *Christian Philosopher*, II, 277.

with which the lower ranks are apt to view the riches and possessions of the great'.<sup>27</sup> Clearly, aesthetic appreciation fulfilled social and didactic roles for Dick. It helped tame the lower orders by inculcating correct moral values and by bringing out their intrinsic goodness.

Dick's faith in the moral efficacy of studies of nature was reflected in his call for free observatories in every major town and for the reform of town and city planning. He was outraged by the squalor and suffering he saw in urban slums but also by their narrow streets, tall buildings and pollution. These blocked workers' view of the vault of the heavens, preventing them from gaining a true appreciation for the beauty and harmony of God's creation and from experiencing the rapture that led to piety and belief. Workers might, and should, read the Bible, Dick wrote. Yet it was contemplation of God's ineffable transcendence--given physical meaning and transparently revealed in the heavens--which would stimulate in them the desired level of piousness. Science which was aesthetically alluring, Dick observed, 'cannot fail to raise the lower ranks of the community [and the upper ranks, he believed but did not state here] from intellectual degradation, and to prevent them from indulging in intemperance, and other sensual vices, which have so long debased our rational nature'.<sup>28</sup>

To conclude this section, it is worth quoting at length from a letter which Dick received from Daniel Simmons, an amateur astronomer. Reading the *Christian Philosopher* inspired Simmons to study science. He addressed Dick as his mentor as he composed an account of his own aesthetic encounters with nature:

never, in all my life, did I have such an overwhelming sense of the Power & Omnipotence of the Deity, as at the moment, when, from that vast Island Universe, clustering rays from no less than a thousand ethereal

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<sup>27</sup>Dick, *Improvement of Society*, pp. 138-39, 393.

<sup>28</sup>*Ibid.*, p. 442.

suns, were "streaming to a point, & centering on my sight".... But for a field of beauty & brightness unsurpassed, I select the Pleiades. Here we have no less than seven suns of a superior lustre, mingling their rays with nearly a hundred other clustering stars, all streaming down the axis of the tube at once, & filling the eye with a light almost insupportable. Yet with all their splendor & magnificence, it does not fill the mind with such awe & sublimity, as when contemplating the double cluster in Perseus. Here we look with wonder & astonishment at the amplitude of the scale upon which creation is built, & as we gaze, the mind expands to infinity, & is finally lost & overwhelmed in attempting to grasp the number of that "vast infinitude of stars" which sweep along the Milky Way... When viewing this cluster for the first time... I could not help calling to mind the exclamation of the lamented Schroeter: ("Heavens, what Omnipotence"!) which he made while viewing the Milky Way with his great Reflector... [And] when we consider the occasion, the naturally enthusiastic temperament of the Astronomer, his sudden surprise & emotion, the "expression" will not only be deemed admissible, but extremely appropriate, & worthy of the man.<sup>29</sup>

Simmons was perhaps unusually sensitive, for looking at the microscopic beauties contained within a piece of frost-covered manure, glistening in the early morning sunlight, transported him into fairy land. Still, from this letter one learns the extent to which Dick and his contemporaries revelled in the aesthetic beauty of nature, and drew religious meaning from their revels. Dick's sentiments and those of many of his contemporaries might best be summed up by an exclamation which Simmons made while examining a fly's wing: 'O that the atheist could contemplate this most admirable piece of Mechanism! I think he would immediately hide his head in confusion, or call on the "rocks & mountains to cover him"'.<sup>30</sup>

## 5.2 The Socio-Political Dimensions of Dick's Writings

In the previous section, I suggested that Dick, in urging shared aesthetic experiences through contemplation of the divine in nature, sought in part to

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<sup>29</sup>D. Simmons to Dick, 2 Jan. 1849, Glasgow Observatory Archives, University of Glasgow. My thanks to Margaret I. Morris for a copy of this letter.

<sup>30</sup>*Ibid.*

maintain social order and to encourage a moral consensus. Indeed, a crucial virtue of natural knowledge to Dick and his predominantly middle class audience was its socially restorative and calming effect. It is difficult to overstate this point. Economic and social upheaval and 'the most sustained and dangerous cycle of revolutionary discontent and working-class protest in British history' characterized the years from 1783 to 1846.<sup>31</sup> One can paint a dire portrait here, pointing to Malthusian threats of an exploding population outstripping the world's supply of food; the eleven innocents killed at Peterloo in 1819; the erosion of traditional communal institutions due to urbanization, and the appalling living conditions and deprivations suffered by workers in the pestilential lanes of crowded towns and cities; social violence resulting from industrialization and the rise of Chartism; growing estrangement between Church and State. The period was perceived at the time to be one of political, social and intellectual instability.<sup>32</sup>

Given this perception, those who sought to promote natural knowledge had a clear interest in portraying it as being uniquely suited to producing halcyon scenes in which social stability and civility would be the norm. As mentioned in chapter two, in 1814 and 1815 Dick wrote a series of articles extolling the virtues of Christianized knowledge disseminated in literary and philosophical societies open to the middling and lower orders. His proposals, and later his lectures, involvement in mechanics' institutes, and books,

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<sup>31</sup>B. Hilton, 'Government and Politics 1783-1846: England, Scotland and Wales', in C. Haigh, ed., *The Cambridge Historical Encyclopedia of Great Britain and Ireland* (Cambridge, 1985), pp. 249-54: 249. This social turmoil is documented in E. Royle and J. Walvin, *English Radicals and Reformers, 1760-1848* (Brighton, 1982); and M.I. Thomis and P. Holt, *Threats of Revolution in Britain 1789-1848* (London, 1977).

<sup>32</sup>Standard historical accounts include A. Briggs, *The Age of Improvement 1783-1867* (London, 1959, 1979); H. Perkin, *The Origins of Modern English Society 1780-1880* (London, 1969); J.F.C. Harrison, *Early Victorian Britain, 1832-51* (London, 1971, 1988); and B. Lenman, *Integration, Enlightenment, and Industrialization: Scotland 1746-1832* (London, 1981).

placed him in the vanguard of those who sought to disseminate knowledge to society's lower orders. Such efforts, known collectively as the 'march of mind' movement, have frequently been dated a decade later and associated too restrictively with Henry Brougham and the Society for the Diffusion of Useful Knowledge (founded in 1826).<sup>33</sup>

What distinguished Dick as an educationalist was that he targeted workers and not just the middle classes. In late Georgian and Regency Britain, literary and philosophical societies, with their high membership fees (from twelve shillings to two guineas annually), typically brought together professionals (clerics, physicians, solicitors) and other gentlemen,<sup>34</sup> along with 'marginal men' with cultural aspirations.<sup>35</sup> Their social functions were diverse--they acted as genteel social clubs and sponsors of practical knowledge while seeking both to reduce social turmoil and to glorify God<sup>36</sup>--but they were united in their reluctance to admit workers as members.

Indeed, well into the 1820s the movement for rational recreation was of and for the middle classes, who, to maintain their social position and prestige, deliberately excluded workers.<sup>37</sup> A further obstacle which both

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<sup>33</sup>See H. Brougham, *Practical Observations upon the Education of the People, addressed to the Working Classes and their Employers* (London, 1825). On the character of the SDUK and the many uses to which it put science see J.N. Hays, 'Science and Brougham's Society', *Annals of Science*, 20 (1964), 227-41.

<sup>34</sup>On the élitist tone of Lit. & Phil.'s see R. Kargon, *Science in Victorian Manchester*, pp. 6-9, 28-29.

<sup>35</sup>A. Thackray, 'Natural Knowledge in Cultural Context: The Manchester Model', *American Historical Review*, 79 (1974), 672-709, esp. 678, 682, 686-93. Thackray shows the diversity of social roles which Lit. & Phil.'s filled, in particular the social legitimation of marginal men.

<sup>36</sup>S. Shapin, 'The Pottery Philosophical Society, 1819-1835: An Examination of the Cultural Uses of Provincial Science', *Science Studies*, 2 (1972), 311-36, esp. 320. See also chapter six, section one.

<sup>37</sup>On rational recreation see H. Cunningham, *Leisure in the Industrial Revolution c.1780-c.1880* (London, 1980), pp. 90-92; P. Bailey, *Leisure and Class in Victorian England: Rational Recreation and the Contest for Control*,

workers and middle-class promoters of education faced, primarily during the 1820s and 1830s, was resistance from those who feared that educated workers would become more dangerous workers.<sup>38</sup> Dick's friend Robert Mudie was not alone in observing rather ominously that, in studying natural philosophy, the labouring classes in Edinburgh had become 'more intelligent and delightful as a people' but also 'much more dangerous as a mob'.<sup>39</sup>

Not too proud or afraid to target workers, Dick exhorted the higher orders to support the dissemination of knowledge to their social inferiors. Arguing that the influence of literary and philosophical societies had been 'too much confined to the higher circles of society', Dick declared that, when opened to members from 'the middling and lower ranks', such societies would

produce a benign influence on the state of morals and of general society.... The habits of order, punctuality, and politeness, which would prevail in such associations would naturally be carried into the other relations and departments of life, and produce their corresponding effects.<sup>40</sup>

Enlightened workers, Dick observed, might not 'tamely submit to tyrannical measures' but they would 'always form the strongest bulwark around a wise and upright administration'.<sup>41</sup>

Similar themes were embraced, expanded upon, and somewhat secularized in the 1820s by advocates of mechanics' institutes who like Dick saw knowledge as having implications for social control.<sup>42</sup> Like other middle-class

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1830-1885 (London, 1978), pp. 6, 38-42, 50-55.

<sup>38</sup> See, for example, H. Perkin, *Modern English Society*, pp. 290-308.

<sup>39</sup> R. Mudie, *Modern Athens*, p. 278.

<sup>40</sup> *The Monthly Magazine; or, British Register*, 37 (Apr. and July 1814), 219-21, 507-10; 38, (Aug. and Sept. 1814, Jan. 1815), 23-25, 121-22, 503-06.

<sup>41</sup> *Ibid.*, 220.

<sup>42</sup> S. Shapin and B. Barnes, 'Science, Nature and Control: Interpreting Mechanics' Institutes', *Social Studies of Science*, 7 (1977), 31-74, esp. 32, 34, 36; G.S. Kitteringham, *Studies in the Popularization of Science in England, 1800-30* (Kent Univ. Ph.D. thesis 1981), ch. 7. The idea that

reformers, Dick saw mechanics' institutes as privileged social spaces in which men of different political parties, professions and religions could put aside politics, class distinctions, and sectarian disputes.<sup>43</sup> Instead they could concentrate on social and moral progress by together combating ignorance and superstition.<sup>44</sup> This progress was to be made broadly consistent with evangelicalism and middle-class values.

Here I differ significantly from Shapin's, Barnes's and J.V. Smith's accounts of Dick's motives.<sup>45</sup> In Smith's account, Dick emerges as a somewhat priggish thinker who launched 'a full-scale assault on popular [that is, workers'] culture'. Smith concluded that 'The manners and morals [and pursuits] of the lower classes were, for Dick, an affront to Christian decency, and scientific education seemed to afford a means for effecting their

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knowledge could soothe the lower classes was not new. The Royal Society in the 1660s had argued that cooperative efforts in natural philosophy both advanced knowledge and also enhanced social stability, and they claimed the Society was open to Christians of all classes. Indeed, this was an ever-recurring theme. In the 1830s, leading figures in the newly-founded British Association employed evidence from nature and promoted science as producing social order and Christian norms. See J. Morrell and A. Thackray, *Gentlemen of Science*, pp. 29-34.

<sup>43</sup>An extensive literature exists on mechanics' institutes. The following works are essential: I. Inkster, ed., *The Steam Intellect Society--Essays on Culture, Education and Industry circa 1820-1914* (Univ. of Nottingham, 1985); idem, 'The Social Context of an Educational Movement: A Revisionist Approach to the English Mechanics' Institutes, 1820-1850', *Oxford Review of Education*, 2 (1976), 277-307; idem, 'Science and the Mechanics' Institutes, 1820-1850: The Case of Sheffield', *Annals of Science*, 32 (1975), 451-74; J.F.C. Harrison, *Learning and Living, 1790-1960: A Study in the History of the English Adult Education Movement* (London, 1961), esp. pp. 57-151. Also useful are E. Royle, 'Mechanics' Institutes and the Working Classes, 1840-1860', *Historical Journal*, 14 (1971), 305-21; J.V. Smith, *The Watt Institution, Dundee 1824-49* (Abertay Historical Society, 1978).

<sup>44</sup>On the need to overcome superstition among the lower orders see Dick, *Improvement of Society*, pp. 18-43; and G.S. Kitteringham, 'Science in England, 1800-30', pp. 50-54.

<sup>45</sup>J.V. Smith, 'Reason, Revelation, and Reform: Thomas Dick of Methven and the "Improvement of Society by the Diffusion of Knowledge"', *History of Education*, 12 (1983), 255-70; idem, 'Manners, Morals and Mentalities', in W.M. Humes and H.M. Paterson, eds., *Scottish Culture and Scottish Education 1800-1980* (Edinburgh, 1983), pp. 25-54.

much needed reformation'.<sup>46</sup> It is true that Dick shared the prevailing middle-class view that workers preferred patronizing pubs and other dens of iniquity and intrigue to churches and more rational pursuits, and that their base habits rendered them indolent or even insolent in performing their duties.<sup>47</sup> Yet for Dick duty was defined not in economic terms but in terms of Christian love, and it was to be fulfilled by all orders of society. Thus he attacked not only those workers' recreations, but also those of the middle and higher orders of society, which he believed were incompatible with love of God and neighbour and which could therefore delay or possibly prevent the coming of the millennium.<sup>48</sup> In an evangelical context, and with the millennium always in mind, love for one's fellow humans for Dick translated into the reform of their ungodly and impious habits to prepare them for eternity.

This millenarian aspect was of decisive importance. Dick was not concerned primarily with social control of workers, as Smith or Shapin and Barnes would have us believe.<sup>49</sup> Rather, his concern was with prophecy and pacifism. Social order for Dick was not a conspiratorial plot which insidiously preserved established social hierarchies but a Christian imperative which was 'the first or most general idea of Morality'.<sup>50</sup> It is worth repeating that, in his attempt to ameliorate and regenerate 'the moral

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<sup>46</sup>J.V. Smith, 'Manners, Morals and Mentalities', 44-5.

<sup>47</sup>S. Shapin, 'Pottery Philosophical Society', esp. 332; R.D. Storch, 'The Problem of Working-class Leisure. Some Roots of Middle-class Moral Reform in the Industrial North: 1825-50', in A.P. Donajgradzki, ed., *Social Control in Nineteenth century Britain* (London, 1977), pp. 138-62.

<sup>48</sup>Dick, *Mental Illumination*, p. 372. On the centrality of Christian love in Dick's morality see *Philosophy of Religion*, pp. 30-1, 176.

<sup>49</sup>S. Shapin and B. Barnes, 'Science, Nature and Control', esp. 50 and 67, fn. 19.

<sup>50</sup>Dick, *Philosophy of Religion*, p. 27.



characters and dispositions of mankind', he sought to control, or, more accurately, to reform, not just workers but all orders of society. He dreamed not of economic advancement through exploitation of workers but of 'that period foretold in ancient prophecy, when "the nations shall beat their swords into plough-shares, and their spears into pruning hooks, and learn the art of war no more"'.<sup>51</sup>

It is crucial to recall when Dick wrote these words. The year was 1814, Napoleon looked finished, and the time seemed propitious for a reconstitution of society based on Christian principles. He envisioned Christian nations working together, peacefully and with some urgency, to advance the date of the millennium while avoiding the pandemonium of wars and revolutions. Like many evangelicals, his vision was pan-national<sup>52</sup> and his primary motivation was religious, more specifically a desire to evangelise the world to precipitate the millennium.

In his advocacy of rational and Christian social reform--which he expressed with moral earnestness and religious conviction--Dick had much in common with his fellow evangelicals. As Ian Bradley has noted, evangelicals effectively defined the morality of the middle classes, which came to dominate all social levels of Victorian society.<sup>53</sup> This morality espoused a creed of duty which emphasized self-restraint, obedience to superiors, and social reform through Christian philanthropy. Like Chalmers, who sought to eliminate state involvement in poor relief because he believed that it interfered with

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<sup>51</sup> *Monthly Magazine*, 37 (Apr. 1814), 219-21: 220.

<sup>52</sup> See R.H. Martin, *Evangelicals United: Ecumenical Stirrings in Pre-Victorian Britain, 1795-1830* (London, 1983).

<sup>53</sup> I. Bradley, *The Call to Seriousness: The Evangelical Impact on the Victorians* (London, 1976), pp. 26, 113-15, 120, 153.

the course of Christian charity,<sup>54</sup> Dick placed his faith in voluntary, Christian philanthropy. With the seemingly inexorable advance of Bible societies and missionaries, the growing cultural dominance of evangelicalism with its call for genuine and more generous demonstrations of Christian charity, and Chalmers's own philanthropic exploits in the slums of Glasgow in the 1820s, it seemed eminently reasonable, and spiritually proper, to Dick and other evangelicals that they should rely on the power of God's Word and Christian charity to regenerate society.

Unlike some other evangelicals, however, Dick highlighted the role of education, particularly in the sciences, in regenerating society. Two fellow Scotsmen--the Evangelical minister Henry Duncan<sup>55</sup> and George Miller, a natural theologian and pioneer in publishing cheap literature<sup>56</sup>--shared this emphasis. In Dick's view, 'An intellectual, moral, and religious education, universally extended [to all classes], constitutes the essence of the Millennium'. He combined his fervid belief in education, drawn perhaps from more than twenty years' personal experience as a schoolmaster and from the

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<sup>54</sup>S.J. Brown, *Thomas Chalmers and the Godly Commonwealth*, passim; B. Hilton, *Age of Atonement*, pp. 32, 100-08. As Hilton points out, evangelicals were adamant that virtuous action had to be spontaneous and not coerced.

<sup>55</sup>Like Dick, Duncan argued that only a 'religion, combining love to God with love to man--but Christian faith issuing in Christian practice' would avert social calamity. See *The Young South Country Weaver* (Edinburgh, 1821), pp. 63, 66-7. Duncan would later publish the *Sacred Philosophy of the Seasons*, 4 vols. (Edinburgh, 1837), in which he blended devotional exercises with extensive excerpts from the *Bridgewater Treatises*.

<sup>56</sup>Miller's chief works were *Popular Philosophy: or, the Book of Nature Laid open upon Christian Principles...* the whole occasionally intermixed with suitable moral reflections, calculated to excite devotional feelings in the breasts of the young, and to raise the thoughts of the adult, from nature up to nature's God (Dunbar, 1826); and *Latter Struggles in the Journey of Life; or, the Afternoon of my Days...* the real life of a country bookseller (Edinburgh, 1833).

superiority of Scotland's school system when compared to that of England's,<sup>57</sup> with philanthropy engendered and informed by intense evangelical effort.<sup>58</sup>

It must be recognized, however, that in philanthropy sometimes the left hand knew what the right hand was giving. As J.V. Smith astutely noted, philanthropy implied a social topography in which near insurmountable heights separated needy beneficiaries from their wealthy benefactors, that these heights were both natural and permanent, and that, in aiding their poorer brethren, philanthropists gained heightened standing in their own communities and even perhaps in the eyes of God.<sup>59</sup>

Yet Dick did not go easy on the wealthy. He declared that those who earned £500 a year should contribute £100 annually to fund religious and intellectual improvements. Those who earned more he advised to give proportionately more. Thus those earning £1000 were to contribute £300, while those earning £10,000 were to contribute £4000. And he declared that

where a wealthy individual has no family of his own, I conceive it is his bounden duty to devote at least the one half of his riches to such purposes. Till such views and practices become more general among Christians, we must still look forward to a distant period for the arrival of the Millennium.<sup>60</sup>

Dick's reliance on voluntary philanthropy rather than State intervention was consistent with his distrust of State involvement in religion. Opposing Established churches and State intrusions into parish affairs was a position upon which New Licht Antiburgher Seceders like Dick built their religious identity. It appears that Dick himself believed that the Biblical phrase

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<sup>57</sup>For a concise description of the 'Scottish tradition' in education see R.D. Anderson, *Education and Opportunity in Victorian Scotland: Schools & Universities* (Oxford, 1983), pp. 1-26.

<sup>58</sup>J.V. Smith, 'Reason, Revelation and Reform', 268-69.

<sup>59</sup>J.V. Smith, 'Manners, Morals and Mentalities', p. 28.

<sup>60</sup>Dick, *Mental Illumination*, p. 357.

'abomination of desolation' condemned any union between Church and State.<sup>61</sup> For Dick, social reform had to rely not on State efforts but on the spontaneous efforts of individuals working in unison and guided by the light of Scripture and Nature.

What distinguished Dick from his fellow educationalists Henry Duncan and George Miller was the heavy stress which he placed on the efficacy of astro-theology. Pious contemplation of the heavens, he believed, would revivify Christianity by shifting people's concerns from divisive doctrinal disputes and rivalries between creeds--the wellspring of sin within Christianity--to moral lessons of brotherly love and God's benevolence.<sup>62</sup> From this a better society would necessarily follow.

However, one might perhaps be excused from supposing at first glance that Dick was merely another 'egregious' astro-theologian who lectured that the heavens showed the lower orders the wisdom of keeping to their inferior station in society.<sup>63</sup> He did suggest that gradation of social ranks had been appointed by God, and that, just as hierarchical structures preserved order and tranquillity in the heavens, so too did they preserve social harmony within human society.<sup>64</sup> Their disruption, Dick cautioned, would plunge the universe and human society 'into a scene of anarchy and confusion', with most individuals becoming 'lawless banditti'. Even when the spirit of Christian love became diffused throughout society, he predicted that 'every station and

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<sup>61</sup>James Macara to Dick, 20 Jan. 1842, NLS MS 9658 ff 62-5.

<sup>62</sup>Dick, *Improvement of Society*, p. 434.

<sup>63</sup>On the 'egregious' Dick see S. Schaffer, 'The Nebular Hypothesis and the Science of Progress', in J. Moore, ed., *History, Humanity, and Evolution*, pp. 131-64: 153.

<sup>64</sup>As Jenifer Hart notes, within the Church of England this remained the prevailing view well into the 1870s. See her 'Religion and Social Control in the mid-Nineteenth Century', in A.P. Donajgradzki, ed., *Social Control in Nineteenth century Britain*, pp. 108-37.

rank would [continue to] contribute, in its sphere, to the prosperity and happiness of another. For the poor cannot do without the rich, nor the rich without the poor....'<sup>65</sup> It would seem as if Dick wanted to keep the lower classes in their place by aligning astro-theology and an orderly, clockwork universe with established social hierarchies.

The first clue that critiques based on class are inappropriate here lies in Dick's terminology. He used 'ranks' and 'stations'--the social terminology of the eighteenth century. He was not explicitly or implicitly seeking to justify class divisions or to eliminate class antagonism in an attempt to safeguard modern industrial society. Indeed, such a society scarcely existed when he wrote. Dick was still very much operating within an eighteenth-century tradition. Like most of his fellow educationalists, he accepted without question 'a pattern of society whose values were symbolised by the terms rank, station, duty and decorum'.<sup>66</sup>

Although he believed society's stations and inequities were 'God-appointed', Dick also declared they were the undesirable results of humanity's fall from grace. They were reversible, but one did not achieve social reform through fomenting revolution. That way led to devilry, chaos, and the reign of intelligent demons, as the French Revolution had shown. Moral reform through Christ's two great commandments was the answer. Here the venerability of social stations or secular institutions was irrelevant. Evils to be overcome were class-based in the sense that higher orders most often sinned in their pride, lower orders in their insubordination. But it was sin which was the ultimate evil--to be combatted by all orders together. In this effort, Dick, like Chalmers and other evangelicals, advocated philanthropy--

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<sup>65</sup>Dick, *Philosophy of Religion*, pp. 29-30, 111-12.

<sup>66</sup>V.E. Neuburg, *Popular Education in Eighteenth Century England* (London, 1971), p. 2.

made universal through the propagation of the Gospel--as constituting the Christian's way of reconstituting society and inaugurating the long-awaited millennium.

Moreover, unlike Chalmers, Duncan and Andrew Ure,<sup>67</sup> Dick was not an apologist for political economy. This subject was sometimes taught in mechanics' institutes to 'prove' to workers the foolhardiness and futility of organized action against their employers.<sup>68</sup> With their rising political power and prosperity, combined with their fear of a chaos-producing revolution of the nature of the French, many factory owners and merchants embraced political economy and supported only those incremental reforms which enhanced their own social position while simultaneously serving as a palliative to unruly workers disenchanted or disoriented by the divisive forces unleashed by industrialization.<sup>69</sup>

Furthermore, Dick did not seek to provide, as did Ure, a bourgeois rationale for the industrial society then emerging. Whereas Ure advocated educational curricula for mechanics' institutes which would favour technical subjects, with the twin goals of improving industrial processes and of increasing commerce and profits, Dick placed religious concerns first. He differed from most patrons of mechanics' institutes in his passionate plea

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<sup>67</sup>On Ure see W.V. Farrar, 'Andrew Ure, F.R.S., and the Philosophy of Manufactures', *Notes and Records of the Royal Society*, 27 (1973), 299-324; and E.P. Thompson, *The Making of the English Working Class*, pp. 395-402.

<sup>68</sup>Political economy was too obviously a mode of indoctrination, however, and was therefore rejected by workers. See J.V. Smith, 'Manners, Morals and Mentalities', p. 31. See also M. Berg, *The Machinery Question and the Making of Political Economy 1815-1848* (Cambridge, 1980), ch. 7.

<sup>69</sup>On the middle class and its role in education and intellectual culture see H. Perkin, *Origins of Modern English Society*, esp. ch. 8; H.M. Wach, 'Culture and the Middle Classes: Popular Knowledge in Industrial Manchester', *Journal of British Studies*, 27 (1988), 375-404. Wach concludes 'Manchester's middle classes wanted a tranquil work force' but even more than this they wanted to satisfy their cultural aspirations by aping 'the embellishments and accomplishments of great cities' (403).

that all of its courses of instruction 'ought to be founded on the basis of the Christian revelation'. Believing that workers' progress and their social integration depended crucially on their receiving an education in the sciences informed by Christianity, he attacked those mechanics' institutes which, in attempting to avoid sectarian disputes, de-emphasized or excluded religion. He warned that 'in so far as the truths of Christianity are set aside, or overlooked, in our plans of instruction', these plans contributed to a secularizing trend which would eventually 'sap the foundations of social order, and banish happiness from the abodes of men'.<sup>70</sup>

In using the teachings of Christ as the basis for his social critique, Dick maintained a guarded optimism, based on a strong belief in the efficacy of education and tempered by a less-than-fatal pessimism based on humanity's depravity, which his contemporaries found attractive, powerful, and even highly controversial. In attacking various seats of privilege--the pension list for allegedly favouring members of the nobility and gentry, the Duke of Wellington for his excessive demands on the British treasury, bishoprics in the Church of England for their immoderate wealth<sup>71</sup>--Dick drew the ire of the *British Critic*, mouthpiece for High Church/Tractarian Anglicans.<sup>72</sup> Dick's proposals to redistribute wealth more evenly and fairly, the *Critic* warned, were nothing less than 'rabid radicalism' which risked 'general pillage'. The *Critic* concluded that in Dick's proposed reforms 'almost all is dreamy, and exaggerated and Utopian; so that the truth itself loses its usefulness when mixed up with these rash and visionary speculations--these

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<sup>70</sup>Dick, *Improvement of Society*, pp. 445, 453, 471.

<sup>71</sup>Dick, *Mental Illumination*, pp. 352-55.

<sup>72</sup>From 1836 to 1838 this periodical was in a period of transition from Hackney Phalanx control to Tractarian control. See S.A. Skinner, 'The Social Thought of the Oxford Movement, with Specific Reference to the *British Critic* 1827-1843' (Oxford Univ. M.Phil. thesis 1989), ch. 1.

chimerical and impossible projects, the mere rhodomontade of philosophy and philanthropy'.<sup>73</sup>

It is clear that, rather than being an apologist for the status quo or for an emergent class structure, Dick wanted instead to redefine social status based, not on rank or class, but on merit measured by moral and intellectual criteria:

human characters [should] be estimated according to their real and intrinsic worth, independant [sic] of those external and adventitious circumstances with which they may be accompanied; and it will be peculiarly becoming in rational associations to set an example of estimating the characters of men on principles purely of a moral and intellectual nature.<sup>74</sup>

In this effort, he could be equally critical of the lower and upper orders. Like other middle-class evangelicals, he mistrusted the former and eagerly debunked the supposed superiority of the latter:

The poor and ignorant peasant looks up with a kind of veneration to my lord and my lady, as if they were a species of superior beings, though, perhaps, with the exception of a few trifling accomplishments, they are scarcely raised above the level of the vulgar whom they despise, in respect to intellectual attainments; and they are often far beneath them in those moral accomplishments which constitute the true glory of man,--being too frequently the slaves of many foolish caprices and unhallowed passions.<sup>75</sup>

And in a striking passage in which he placed a braggart of the aristocracy in the abodes of the cherubim and seraphim, Dick declared that whatever this man would by his very nature seek to boast of, whether his patrimony, land, or his skill as a boxer or marksman, 'He would be overwhelmed with shouts of indignation, and instantly hissed from their abodes'.<sup>76</sup>

In the balance, Dick was perhaps kinder to workers. Though unstable,

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<sup>73</sup>Anon., 'Dick, "on the Moral Improvement of Mankind"', *The British Critic, Quarterly Theological Review, and Ecclesiastical Record*, 19 (1836), 90-9.

<sup>74</sup>Dick, *Monthly Magazine*, 37 (1814), 507-08.

<sup>75</sup>Dick, *Improvement of Society*, p. 390.

<sup>76</sup>Dick, *Future State*, p. 273.



largely given over to superstition, and susceptible to 'laziness and inattention', in the honesty of their labour workers were also 'more likely than any other class of society to strike out a new path which may lead to some useful invention in the arts, or discovery in the sciences'.<sup>77</sup> Coming from Dick this was indeed high praise, for he treated those who made discoveries in science almost as prophets in that through their discoveries they provided further revelations of God's wisdom, goodness, and power.

### 5.3 Dick and the Moral and Social Reform of Society

[Our opinions] were somewhat extreme, they were the hot and burning scintillations of liberty-loving and imaginative souls, who in the hey-day of youth worship the ideal of beauty and reason, and wonder at all who do not bow before the same idols as they do.

James Myles, a Dundee shoemaker, writing of the informal debating society which he formed with other workers in the 1830s.<sup>78</sup>

How to persuade thoughtful workers like Myles to eschew Chartism for more measured and peaceful social reforms was a major dilemma for Dick and his fellow middle-class reformers. This section addresses Dick's specific proposals for social and moral reform. It is suggested that much commonality existed between his social agenda and those of other middle-class reformers like the phrenologist George Combe and the Scottish publisher and author Robert Chambers. These men used evidence from nature as a basis for gradual social reform, advocating social progress through hard work and other norms and practices to which evangelicals were sympathetic.<sup>79</sup> Combe in particular

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<sup>77</sup> Ibid., pp. 221, 226.

<sup>78</sup> J. Myles, *Chapters in the Life of a Dundee Factory Boy; An Autobiography* (Dundee, 1850), p. 78.

<sup>79</sup> Ibid., p. 129; J.A. Secord, 'Behind the Veil: Robert Chambers and Vestiges', in J. Moore, ed., *History, Humanity, and Evolution* (Cambridge, 1989), pp. 165-94.

makes a fascinating comparison with Dick, in part because they shared a strong belief in social progress through educational curricula informed by science and invested with moral values.

In discussing social and moral reform in Victorian society, one must first recognize that, for the vast majority of Victorians, the keystone of this was human immortality and the reality of a future state of eternal rewards or punishments.<sup>80</sup> As Hugh Miller so eloquently put it, Victorians believed that their cemeteries were 'charged with the sown seed of the future'.<sup>81</sup> If there was no life after death, Dick observed,

man appears an enigma, a rude abortion, and a monster in nature, his structure is inexplicable, and the end for which he was created an unfathomable mystery; the moral world is a scene of confusion, the ways of providence a dark impenetrable maze, the universe a vast, mysterious and inexplicable system, and the Deity a Being whose perfections and purposes can never be traced nor unfolded.<sup>82</sup>

He could well afford to be brazenly forthright here since the idea that death marked the annihilation of human souls seemed utterly preposterous to nearly all his contemporaries.

With the promise of immortality in heaven as the chief bulwark of morality on earth, specific social and moral reforms were for Dick to be grounded in Scripture. Hence he rejected Hume's, Reid's, and other non-Bible-based moralities. These overlooked or discarded 'The only true principles of moral action, which revealed religion inculcates'. He particularly chided Benthamites--those who believed that social order and virtue had their foundation in the self-interested actions of rational individuals. That virtue is founded on utility, Dick wrote, is a valid notion, 'if, by utility, is meant, a tendency to promote happiness. But it by no means follows... that

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<sup>80</sup>F.M. Turner, *Contesting Cultural Authority*, pp. 108-10.

<sup>81</sup>H. Miller, *Testimony of the Rocks* (Boston, 1857), p. 140.

<sup>82</sup>Dick, *Future State*, pp. 135-36.

utility is the guide, or the rule by which we are to be directed in our moral conduct'. Scripture, not secular philosophies, provided this guide or rule with a plainness and perspicuity which made it ideally suited to humans as fallen and limited intelligences:

It appears somewhat preposterous to waste our time... in laboured metaphysical disquisitions, to ascertain the foundations of virtue, and the motives from which it is to be pursued; whether it consists in utility, in the fitness of things... when every useful question that can be started on this subject may be immediately solved by a direct application to the revelations of heaven, and an infallible rule derived for the direction of our conduct in all the circumstances and relations in which we may be placed.<sup>83</sup>

Christian love provided this infallible rule, whose 'existence in the heart, and its operation in active life, will form the decisive test of our characters at the final judgment'.<sup>84</sup>

Because they lacked this rule, secular moral systems were as a result fatally flawed, for in them 'every one would consider himself as at liberty to act according as his humour and passions might dictate; and, in such a case, a scene of selfishness, rapacity, and horror, would quickly ensue....'<sup>85</sup> To prevent such a moral cataclysm, Dick averred that 'It is now high time that the sincerity of a profession of Christianity should be tried by the test of pounds, shillings and dollars'. It was the inescapable duty of true Christians blessed with money or power or both to help the lower classes, with the ultimate goal being the 'spiritual improvement and the eternal happiness of mankind'.<sup>86</sup>

Intransigent or penurious members of higher social stations, Dick implied, should recall the French Revolution. To Dick this had not been all

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<sup>83</sup>Dick, *Philosophy of Religion*, pp. 24-5, 194, 281.

<sup>84</sup>*Ibid.*, p. 176.

<sup>85</sup>Dick, *Philosophy of Religion*, p. 194; *Improvement of Society*, p. 453.

<sup>86</sup>Dick, *Mental Illumination*, p. 378; *Future State*, p. 374.

bad: 'It roused millions, from among the mass of the people, to assert those rights and privileges, to which they are entitled as rational beings, and which had been withheld from them by the strong hand of power'. The most important of these rights for Dick was the freedom to learn, the freedom to pursue knowledge.

In Dick's view, education was first and foremost an uplifting moral activity, one which should stress piety, mental discipline, industriousness, cooperation and selflessness. When these canons of moral conduct were thoroughly inculcated in society, he predicted that workers would become less surly, and the landed, professional and mercantile orders would eschew sybaritic pursuits and become more sympathetic to the needs of workers. With piety and an appreciation for social harmony as natural outcomes of shared educational experiences, class divisions would become obsolete. Awaiting humanity was social peace and the onset of the millennium.

Recognizing from his own experience that the typical worker had few hours and fewer shillings to spend in pursuing knowledge, Dick proclaimed that he

must be paid such wages as will enable him to procure such conveniences, and the means of instruction, otherwise it is next thing to an insult to exhort him to prosecute the path of science. *The long hours of labour, and the paltry remuneration which the labourer receives in many of our spinning-mills and other manufacturies, so long as such domestic slavery and avaricious practices continue, form an insurmountable barrier to the general diffusion of knowledge.*<sup>87</sup>

Along with improved working conditions and higher wages, Dick further insisted that the latest labour-saving machinery should be used to increase workers' leisure, not owners' profits. With these new machines, an eight-hour work day was now more than long enough, he opined. Money for free libraries, schools, museums, observatories and the like was to be got, as we have seen, through

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<sup>87</sup>Dick, *Improvement of Society*, pp. 225-26. Emph. in orig.

voluntary philanthropy graduated by income.<sup>88</sup>

Dick was of course not alone in arguing for shorter work days, improved working and living conditions, and better educational opportunities for the lower orders. George Combe argued similarly. It is especially useful to compare Dick with Combe, in part because they corresponded intermittently. Dick was one of the recipients of a precirculated version of Combe's *The Constitution of Man* (1828), which became one of the scientific bestsellers of the nineteenth century, with 100,000 sold in Britain and 200,000 sold in America by 1860. Dick wrote to Combe in January 1828 that he was 'almost ashamed... that I am altogether ignorant of Phrenology.'<sup>89</sup> It is without any reference to this subject that I have conceived a very high opinion of your essay and a very high esteem and respect for the author'. If not for its phrenology, why did Dick applaud Combe's work? For he was generous with his applause, writing that

Most earnestly do I wish, that, a copy of it were in every house - that the truths & maxims it contains were impressed on every heart, and that Society were constructed and maintained on the principles which it exhibits - and then what a world this would be to live in, compared to what it now is! Peace in the broadest acceptation of the term would take the place of war, and all those bickerings in private life that break in and disturb the happiness of mankind would be subdued by those kindlier feelings that spring from the operations of benevolence and justice.<sup>90</sup>

As Roger Cooter has noted, this book preached a code of social behaviour whose virtues were 'temperance, cleanliness, regular habits, work discipline, the nuclear family, individualism, property rights, and free trade....' It further preached that, by cultivating moral sentiments and the intellect,

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<sup>88</sup>Dick, *Mental Illumination*, pp. 378, 430.

<sup>89</sup>Local geography may have limited Dick's exposure to phrenology. In 1828, he had just moved from Perth to the Dundee area. If he had made this move earlier, he perhaps would have been more familiar with phrenology, given the strong presence of the Mechanics' Phrenological Society in Dundee.

<sup>90</sup>Dick to Combe, Jan. 1828, NLS MS 7221 ff 61-2.

humans could maximize happiness in society.<sup>91</sup> In this book, and in his later writings, Combe called for a reformed, but not levelled, social hierarchy to be based on merit defined by moral and intellectual attainments.<sup>92</sup> Social progress he made attendant upon the efforts of educationalists to stimulate properly these moral and intellectual faculties by diffusing knowledge of science. All of this Dick found congenial.

What Dick found uncongenial was Combe's notion of human perfectibility. He warned him that

You are likely to be attacked by the Champions of Orthodoxy both within and without the Church, because your whole reasoning appears to set aside the doctrine of Original Sin, and by consequence the necessity of an atonement. They will therefore assail you as having discarded the whole scheme of Revelation which it is assumed is utterly at variance with your doctrine of the perfectibility of man, and certainly there are difficulties here that are not easily to be got over - and which I as a stickler for orthodoxy am anxious to see removed...<sup>93</sup>

The tension here between enlightenment rationalism and human perfectibility versus evangelicalism and human depravity is palpable. Dick believed in self-improvement or self-help<sup>94</sup> but not in human perfectibility. Yet, as long as Combe remembered to speak of God's omnipotence and humanity's benightedness, Dick continued to applaud him. In fact twenty years later he applauded Combe's *Remarks on National Education* and his *On the Relation between Religion and Science*, writing that the sentiments which appeared in

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<sup>91</sup>R. Cooter, *Phrenology*, pp. 121-2; B. Hilton, *Age of Atonement*, pp. 192-98.

<sup>92</sup>T.M. Parssinen, 'Popular Science and Society: The Phrenology Movement in Early Victorian Britain', *Journal of Social History*, 8 (1974), 1-20: 6-7.

<sup>93</sup>Dick to Combe, Jan. 1828, NLS MS 7221 ff 61-2. See also T.M. Parssinen, 'Popular Science and Society', esp. 5, 10.

<sup>94</sup>On Smiles and self-help as a middle-class ideal see A. Briggs, 'Samuel Smiles and the Gospel of Work', in *Victorian People: A Reassessment of Persons and Themes 1851-67* (Harmondsworth, 1971), pp. 124-47; and K. Fielden, 'Samuel Smiles and Self-Help', *Victorian Studies*, 12 (1968-69), 155-76.

them corresponded almost entirely with his own.<sup>95</sup> In the latter pamphlet,<sup>96</sup> Combe declared that, because churches either undervalued or ignored completely evidence from nature, cultivators of science were blameless in ignoring God since the churches had never taught them 'the sacred character of Nature'.<sup>97</sup> Where Dick differed from Combe, of course, was in his advocacy of traditional evangelical tenets like human depravity and in preserving a role for these in the production and diffusion of knowledge.

Dick's expressions of sympathy and support for Combe, however, go some way towards validating Cooter's observation that, despite his criticism of evangelicals, Combe ironically ended up teaching values and virtues almost identical to theirs. Where he differed, and the difference was drastic, was in his affirmation that moral laws in society should be based exclusively on evidence from nature. Evangelicals could sanction natural knowledge as a social legitimating resource which generated respectable middle-class values. But they could not tolerate it when it became separated from, and even tried to supplant, Christianity.

A separate question is whether Combe and Dick were sincere in their concern for the plight of workers. With respect to Combe's views, Roger Cooter has concluded that here

lay no interest in the working class for their own sake, but rather the hope that the working class might be brought to share the author's own rationalist mindscape: after all, by spending less time on factory floors, workers would have more time to study phrenology and the "laws of nature"!.<sup>98</sup>

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<sup>95</sup>Dick to Combe, 5 June 1847, NLS MS 7284 ff 106-7.

<sup>96</sup>This became the ninth chapter of an expanded edition of *Constitution* in 1847; Combe later expanded it into a book. See D. de Giustino, *Conquest of Mind: Phrenology and Victorian Social Thought* (London, 1975), pp. 130-31.

<sup>97</sup>G. Combe, *On the Relation between Religion and Science* (Edinburgh, 1847), pp. 7, 14.

<sup>98</sup>R. Cooter, *Phrenology*, p. 126.

In the case of Combe, an upwardly mobile lawyer-turned-phrenologist who devoted considerable effort to managing his stocks and bonds, such scepticism on the part of the historian may well be justified. It is conceivable that Combe's reforms and his advocacy of phrenology were intended both to provide stability in a society experiencing the throes of industrialization and to enhance his own social position, wealth and power.<sup>99</sup> But for Dick this emphasis is less plausible. A Christian pacifist whose faith in a moral code based on Christ's two great commandments was absolute, his was a strategy for measured and peaceful reform to prepare workers, and all other social classes, for the millennium.

But where did phrenology enter the picture? The point is that Dick failed to examine it throughout all his extensive writings on popular science. This requires some elaboration. Phrenology itself proved to be a remarkably ubiquitous and flexible intellectual resource in early Victorian Britain.<sup>100</sup> It found favour both in radical political circles and from a minority of evangelicals who considered its emphasis on human imperfections as evidence confirming humanity's depravity.<sup>101</sup> The great majority of evangelicals, however, attacked or avoided phrenology because they saw it as overly optimistic about human potential and as leading to materialism and

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<sup>99</sup>R.J. Cooter, 'Phrenology: The Provocation of Progress', *History of Science*, 14 (1976), 211-34: 219.

<sup>100</sup>Besides Cooter's and de Giustino's books and Parssinen's article, see also Cooter, 'Phrenology: The Provocation of Progress'; S. Shapin, 'Phrenological Knowledge and the Social Structure of early Nineteenth-century Edinburgh', *Annals of Science*, 32 (1975), 219-43; *idem*, 'Review of de Giustino', *BJHS*, 10 (1977), 177-79; P. Baxter, 'Science and Belief in Scotland', pp. 158-88.

<sup>101</sup>R. Cooter, *Phrenology*, pp. 54, 320 n.40; D. de Giustino, *Conquest of Mind*, ch. 6, esp. pp. 119-24 on 'Christian Phrenologists'.



atheism.<sup>102</sup> Dick, I believe, is to be counted in this group.

Though he never explicitly attacked phrenology, an unsigned review of Combe's *Constitution* did appear in the *Education Magazine* when Dick was its editor. The reviewer (either Dick himself or with Dick's approval) stated that phrenology 'seeks to mystify by assumed facts' and was yet too young a science to have any authority. 'To assert that a man cannot be penetrated by the love of God, except that a particular cerebral organization shall exist', the reviewer continued, 'is at once to deny one of the first principles of religion, and one of the highest motives of action'.<sup>103</sup> This curt dismissal of phrenology as a puppy of a science with a highly dubious pedigree is consistent with a complete lack of references to it in any of Dick's writings. Unlike geology, which was arguably equally contentious but which had an impeccable scientific pedigree, and which he therefore treated in some detail, Dick found he could ignore the more 'fringe' science of phrenology in his books.<sup>104</sup>

Consistent with Dick's previous (private) expression of praise in 1828, however, this unsigned review did conclude on a positive note, stating that Combe's book 'contains much truth, much sound philosophy, and much practical religion: it will be of extensive usefulness'.<sup>105</sup> This praise makes perfect sense in that Combe, like Dick, advocated educational reform based on the sciences read in a particular way. It is interesting to note here that

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<sup>102</sup> Brewster, Chalmers, Miller, and John Fleming were all against it. See P. Baxter, 'Science and Belief in Scotland', pp. 223-26; *idem*, 'Deism and Development: Disruptive Forces in Scottish Natural Theology', in S.J. Brown and M. Fry, eds., *Scotland in the Age of Disruption* (Edinburgh, 1993), pp. 98-112: 104-05.

<sup>103</sup> Anon., 'Review of Combe's *Constitution*', *Education Magazine* 1 (1835), 307-14: 307-08, 314.

<sup>104</sup> Interestingly, a phrenological reading of Dick's third wife, perhaps done by Combe around 1850, survives. See DCA GD/ Mus 54/9/7, n.d.

<sup>105</sup> 'Review of Combe's *Constitution*', 314.

Caleb A. Wall, a Quaker newspaperman based in Worcester, Massachusetts, grouped Dick and Combe together in his private diary as 'intellectual and Moral worthies' who, along with Chalmers and Paley, deserved to be known by all men.<sup>106</sup> Contemporaries of these men, it would seem, could see them and their ideologies as being more in harmony than present-day readers might at first surmise.<sup>107</sup>

Yet one does need here to distinguish the interests of Dissenters like Dick from those of Evangelicals in the Established Church. Paul Baxter has suggested that the latter may have seen Combe as challenging their control over education with potent references to the book of nature metaphor. For this reason they were predisposed to oppose him. Dissenters, in contrast, may have seen Combe as an ally in their efforts to deny to Evangelicals exclusive control over schools. The *United Secession Magazine* would seem to corroborate this since it did in fact show more tolerance towards Combe than most evangelical publications.<sup>108</sup> But it is also possible that this display of tolerance may have been attributable more to Seceders' individualism and their greater tolerance of political liberalism when compared with Evangelicals.<sup>109</sup> This serves to remind us that the interests of different audiences shape their responses to ideas, whether in the deceptively straightforward process of their popularization or in the negotiations which

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<sup>106</sup>Diary of Caleb A. Wall, AAS Mss, 1840, pp. 10-11. Wall especially respected Combe, saying there was no finer work than his *Lectures on Moral Philosophy*, unless it be his *Constitution of Man*.

<sup>107</sup>As P. Baxter noted with some surprise, Dick's vision of a future state was quite similar to Combeist conceptions of a scientific republic. See his 'Science and Belief in Scotland', p. 277.

<sup>108</sup>Ibid., pp. 180, 194-98, 220, 237. Its position hardened in response to the publication of Chambers's *Vestiges* in 1845.

<sup>109</sup>D.C. Smith, *Passive Obedience and Prophetic Protest: Social Criticism in the Scottish Church 1830-1945* (New York, 1987), pp. 57-59, 71-75; C.G. Brown, *Social History of Religion in Scotland*, p. 36.

take place between authors and readers in shaping textual meanings. In the next chapter, publishing statistics and bibliographical analysis are combined with diaries, letters, and other individual responses to tackle these issues directly.

## Chapter 6

### Thomas Dick and the Audiences for and Cultural Meaning of Popular Science in Britain

This chapter details Dick's role in popularizing science in Great Britain and the meanings ascribed to his works within various cultural settings. In section one, Dick is identified as a key figure in an emerging culture which stressed the need to disseminate knowledge of science among all classes. Opposing the pursuit of science as a profession, he preferred instead to cultivate devotional or Christianized forms of science, which proved attractive to evangelicals. Dick's dealings with his publishers, and the process by which his texts were produced and distributed to readers, how well they sold and at what price, and the extent of their influence, are analyzed in sections two and three by charting the publishing history of his works and their availability in libraries. These sections convincingly demonstrate the considerable popularity and widespread accessibility of Dick's works. The next three sections attempt to show precisely why Dick's works were so popular and the ways in which their meanings fluctuated within specific social contexts. In section four, individual readers' responses to these works are detailed through letters sent to Dick. These responses were as varied and remarkable as the readers themselves. Section five probes the meaning and uses of popular astronomy, particularly that version disseminated by Dick, within working-class settings. The final section examines the cultural meaning of Dick's works in Wales, where they proved especially popular among Calvinistic Welsh Methodists.

## 6.1 Dick, Science and Popular Culture in Britain

[H]e has done more than any living man to render science popular and attractive to the masses.

Anon., 'Dick, Thomas, LL.D.', *Men of the Time* (London, 1856), p. 214.

In the eighteenth century, science was pursued within polite circles as an integral part of literate culture.<sup>1</sup> Literary and philosophical societies stressed its rationality and gentility, gentlemen possessing wealth and leisure pursued it as a lifetime's vocation, and 'marginalised men' used it to gain social prestige and to construct a self-identity. Itinerant lecturers such as the Scotsman James Ferguson and Benjamin Martin<sup>2</sup>--the inheritors and transformers of the traditions of theological lecturers--travelled the countryside (aided by roads newly improved in the 1750s and 1760s), delighting audiences with carefully orchestrated shows which touted science as spectacle while displaying the experimental impresario's wares.<sup>3</sup> Although they often priced their lectures beyond the means of plebeians to maintain science's cultural pedigree in the eyes of gentlemen and ladies,<sup>4</sup> their efforts proved

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<sup>1</sup>S. Shapin and A. Thackray, 'Prosopography as a Research Tool in History of Science: The British Scientific Community 1700-1900', *History of Science*, 12 (1974), 1-28, esp. 4-13; R. Porter, 'Science, Provincial Culture and Public Opinion in Enlightenment England', *British Journal for Eighteenth-century Studies*, 3 (1980), 20-46.

<sup>2</sup>J.R. Millburn and H.C. King, *Wheelwright of the Heavens: The Life & Work of James Ferguson, FRS* (London, 1988); J.R. Millburn, *Benjamin Martin: Instrument Maker, Author and 'Country Showman'* (Leyden, 1976).

<sup>3</sup>S. Schaffer, 'The Consuming Flame: Electrical Showmen and Tory Mystics in the World of Goods', in J. Brewer and R. Porter, eds., *Consumption and the World of Goods* (New York, 1993), pp. 489-526; *idem*, 'Natural Philosophy and Public Spectacle in the Eighteenth Century', *History of Science*, 21 (1983), 1-43.

<sup>4</sup>R. Porter, 'Science, Provincial Culture and Public Opinion', 28-31; A.Q. Morton, 'Lectures on Natural Philosophy in London, 1750-1765: S.C.T. Demainbray (1710-1782) and the "Inattention" of His Countrymen', *BJHS*, 23 (1990), 411-34: 419.

crucial in making science accessible to a wider public.<sup>5</sup>

If the eighteenth century saw the creation of a public and commercial culture for science,<sup>6</sup> the nineteenth century witnessed a surge in the popularity of books on science and a profusion of aquaria, private cabinets of natural history, and other commodities of science.<sup>7</sup> 'Popular science' became a term used frequently by contemporaries to refer to the diffusion of science in books (especially those published after 1826 by the Society for the Diffusion of Useful Knowledge), in periodicals, in lectures, and in formal classes.<sup>8</sup>

At first, science was pursued largely by the middle classes, who sought in it rational amusement, useful instruction and moral uplift. Yet by the 1820s science had spread beyond drawing rooms, parlours, and other upper- or middle-class spaces. Indeed, as early as 1825 Robert Mudie claimed, albeit with some exaggeration, that in Edinburgh society

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<sup>5</sup>I. Inkster, 'The Public Lecture as an Instrument of Science Education for Adults--The Case of Great Britain, c.1750-1850', *Paedagogica Historica*, 20 (1980), 80-107. Inkster notes that in some locales itinerants served as catalysts for the formation of mechanics' institutes, with their lectures (and often they themselves) becoming thoroughly integrated into these institutes (90-94). See also *idem*, 'Culture, Institutions and Urbanity: The Itinerant Science Lecturer in Sheffield 1790-1850', in S. Pollard and C. Holmes, eds., *Essays in the Economic and Social History of South Yorkshire* (Sheffield, 1976), pp. 218-32; A.Q. Morton, ed., 'Science Lecturing in the Eighteenth Century: A Special Issue', *BJHS*, 28 (1995), 1-99; F.W. Gibbs, 'Itinerant Lecturers in Natural Philosophy', *Ambix*, 8 (1960), 111-17.

<sup>6</sup>L. Stewart, *The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660-1750* (Cambridge, 1992); J. Golinski, *Science as Public Culture: Chemistry and Enlightenment in Britain, 1760-1820* (Cambridge, 1992). For an interesting essay review of these two books, see J. Money, 'From Leviathan's Air Pump to Britannia's Voltaic Pile: Science, Public Life and the Forging of Britain, 1660-1820', *Canadian Journal of History*, 28 (1993), 521-44.

<sup>7</sup>See, for example, L. Barber, *The Heyday of Natural History 1820-1870* (New York, 1980), and D. Knight, *The Age of Science: The Scientific World-view in the Nineteenth Century* (Oxford, 1986).

<sup>8</sup>D.A. Hinton, 'Popular Science', p. 25 and esp. ch. 5: 'Popular Science Lectures and Classes', pp. 138-66.

the men of the law give their evenings to Bacchus; those who are called philosophers, give theirs to butterflies; the ladies associate for the purposes of gossiping; and the gentlemen, with praise-worthy gallantry, assist the ladies; while the artizans pursue literature, and study philosophy.<sup>9</sup>

In a complex process, which, as shown in chapter five, was often fraught with ideological and class-based tensions, science by the 1820s had become a viable pursuit for workers, who, whether aided or indoctrinated by mechanics' institutes, variously embraced, rejected, modified, or ignored it.

In making science accessible both to the middle and the lower ranks of society, Dick was a leading innovator. As early as the 1810s, he had targeted both the middle and lower ranks, writing in a sober yet easy style and blending 'useful' knowledge with a pious theology of nature. His aims were well summarized in three biographical accounts published soon after his death. For William Norrie,

His great aim was to Christianise science, and to make men not only wiser, but better. His knowledge of astronomy was accurate and extensive, and he possessed a singular facility in divesting science of its more awful and repulsive attributes, and of rendering it both intelligible and interesting to ordinary minds.<sup>10</sup>

For an anonymous writer in the *Encyclopaedia Britannica*, Dick's works

may be regarded as endeavours by means of scientific discoveries to illustrate particular aspects of religious truth, and to suggest solutions of difficult religious problems. They are written in a popular and fascinating style, and manifest great aptitude for simplifying scientific subjects, and rendering them interesting to non-scientific readers.<sup>11</sup>

A more critical appraisal emerged from the pen of the Rev. William Leitch, D.D. (1814-64). Leitch, a scientific lecturer and evangelical minister who for several seasons directed the University of Glasgow's observatory, wrote that Dick

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<sup>9</sup>R. Mudie, *Modern Athens*, p. 278.

<sup>10</sup>W. Norrie, *Dundee Celebrities* (Dundee, 1873), pp. 170-71.

<sup>11</sup>*Encyclopaedia Britannica*, 9th ed. (1875-89), VII, 173.

enjoyed no special scientific training, and his works have no pretensions to depth of science. Like [James] Ferguson the astronomer, he was incapable of understanding a geometrical demonstration; still his treatises contain a faithful statement of the results of science, and their wide popularity proves their adaptation to the public taste. Much of the success of his writings is due to the fact that he was one of the earliest writers to give a religious bent to the growing taste for science among the masses.<sup>12</sup>

Leitch perhaps saw himself in competition with Dick, in that his book *God's Glory in the Heavens* (1862) occupied the same market niche as Dick's more extensive writings on astronomy. Notwithstanding Leitch's somewhat condescending view of Dick's scientific qualifications, these three accounts do concur in stressing that Dick possessed a considerable gift for making science intelligible and intriguing to general readers. They further agree that running through all of his works was a powerful concern to Christianize science.

Dick described his strategy for Christianizing science best in three letters to the Rev. B.W.S. Vallack. Vallack, a keen amateur astronomer, had written to Dick that he thought his *Celestial Scenery* had dwelt overmuch on God 'in the character of Creator' and had therefore failed to address adequately the leading doctrines of revealed religion, such as the fall of humanity. To this charge Dick replied that

My aim has generally been to deduce such moral reflections, as seemed naturally to flow from the subject, and which should be introduced without seeming to deviate from the main object in view. But were I to introduce and attempt to illustrate the leading doctrines of Christianity, in a work of science, in the present state of civil and Christian society, there is little doubt that many readers would consider such digressions as forced into the service to promote a party purpose, and might throw aside the book on this account.<sup>13</sup>

In two instances, Dick continued, the book in question had been attacked precisely because it referred to doctrines of revealed religion. One

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<sup>12</sup>W. Leitch, 'Thomas Dick', in J.F. Waller, ed., *The Imperial Dictionary of Universal Biography*, 16 vols. (London, 1857-63), II, 92-93.

<sup>13</sup>Dick to Vallack, 12 Oct. 1840, RAS Add MSS 129/8. A draft of Vallack's letter survives. See Vallack to Dick, 22 Sep. 1840, RAS Add MSS 129/13.



erstwhile friend severely upbraided Dick for including passages alluding to the depravity of man, declaring that before he would permit youthful readers to peruse this book, he would have to tear at least a dozen pages from it. Another attack had come from the *Spectator*, which stated that the devotional passages and moral exhortations in this book were 'extraneous' to 'scientific exposition'.<sup>14</sup>

To disarm and win over such critics, a Christian philosopher, Dick wrote, had to combine caution with cunning. He repeated his injunction that religious reflections and pious sentiments had to flow easily and naturally from the subject in question. They had to appear to be unforced or unpremeditated, else they might be rejected by intelligent readers. Dick had, ready at hand, an example of forced sentiment from his tract on the solar system. Unbeknownst to him, the Religious Tract Society had inserted a paragraph into this work which declared that 'The power of the Almighty as manifested in his works is far excelled by its displays in connexion with the mediatorial work of Jesus Christ our Lord'. Dick's objection to this was that it 'blends the physical and moral power of the Deity and makes no distinction between them, and states comparisons where no comparison is admissible'. The immense power that God displayed in maintaining the planets in motion, Dick stated, could not be directly connected to His moral power. Such forced connections, Dick concluded, would not be compelling to thoughtful readers and in fact might lead them to reject the religious sentiment in question.<sup>15</sup>

However, with a reader's curiosity stimulated by the subject at hand, the author could then introduce religious reflections which had been properly deduced or inferred from this subject. Quoting St. Paul, Dick observed that

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<sup>14</sup> *Ibid.*

<sup>15</sup> Dick, *Solar System*, p. 40; Dick to Vallack, 12 May 1846, RAS Add MSS 129/9.

readers would be 'caught "as it were by guile"' and converted to evangelical Christianity. To strengthen his case, Dick cited two readers whom he had 'caught' this way. One was David Livingstone, who at this time had not yet become the near legendary explorer and missionary that he would be ten years later. 'Had works of a purely religious character, however excellent, been put into the hands of such persons', Dick noted, 'it is not likely they would have produced the same effects'.<sup>16</sup>

Thus Dick used engaging passages on nature's wonders to ensnare curious and sensitive readers, who were then almost imperceptibly indoctrinated into evangelical Christianity through fairly unobtrusive and 'natural' religious reflections. Dick admitted to Vallack that this stratagem lacked the forcefulness of direct lessons in Christianity, but less subtle tactics would have resulted in his works being 'less extensively read than they now are'. Critics might carp that his works were at times 'deficient... in evangelical sentiment', but proof of their effectiveness was seen in the conversion of readers like Livingstone.<sup>17</sup>

Clearly, Dick's approach to the popularization of science differed drastically from twentieth-century methods. As previously noted in chapter one, in Dick's day categories like 'religion', 'science' and 'philosophy' had not yet been separated into autonomous disciplines. In fact, with his millennial hopes, Dick saw a time 'approaching when science & religion will go hand in hand, and when it will not be considered as inconsistent with the purposes of science to introduce every fact, and doctrine, & moral requisition of christianity....'<sup>18</sup> It followed that the modern conception that science

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<sup>16</sup>Dick to Vallack, 12 May 1846, RAS Add MSS 129/9.

<sup>17</sup>Dick to Vallack, 12 Oct. 1840, RAS Add MSS 129/8; 12 May 1846, RAS Add MSS 129/9. For more on Livingstone, see section four below.

<sup>18</sup>Dick to Vallack, 12 Oct. 1840, RAS Add MSS 129/8.

should be pursued by dedicated experts and largely for its own sake was one that Dick strenuously attacked.

Dick came to state unambiguously his opposition to science as an autonomous discipline in 1836 when he answered a query from the young David Mackintosh (1815-91), later to become a well known itinerant lecturer:

With regard to your enquiry, "how you might make yourself useful in a scientific point of view - without an additional occupation being necessary?" - I am much at a loss what answer to return. Science has hitherto made so little progress in our country... that few openings are to be found to induce any one to devote himself solely to the objects of science as a profession, with the hope of adequate pecuniary compensation. I am of opinion that persons of all ranks & professions ought to be students and cultivators of science... But... every one ought still to be employed in some active profession, as at present; and no one ought to imagine, that because he has attained to some general knowledge of science, he ought to devote his attention exclusively to such pursuits.<sup>19</sup>

While Dick strenuously encouraged everyone to cultivate science, he clearly did not countenance the emergence of the professional man of science. In the cultural scene of early Victorian Britain, science's salience in society had not yet been translated into its professionalization within that society.<sup>20</sup> As a profession, science was a highly unusual endeavour, and to Dick one which was manifestly not desirable.

As Richard Yeo has shown, science in early Victorian Britain was still a 'marginal activity' whose nature and cultural significance were being hotly contested within a public arena.<sup>21</sup> Dick's opposition to professionalization

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<sup>19</sup>Dick to David Mackintosh, 22 Feb. 1836, NLS MS 584 no. 952.

<sup>20</sup>For perspectives on this complex process see R. Kargon, *Science in Victorian Manchester*, ch. 2, 'The Emergence of the Devotee: The Changing Face of Amateur Science'; M. Berman, '"Hegemony" and the Amateur Tradition in British Science', *Journal of Social History*, 8 (1974), 30-50; F.M. Turner, 'The Victorian Conflict between Science and Religion: A Professional Dimension', *Isis*, 69 (1978), 356-76.

<sup>21</sup>R.R. Yeo, *Defining Science: William Whewell, Natural Knowledge and Public Debate in Early Victorian Britain* (Cambridge, 1993), pp. 28-48, 78-87, 108-27; *idem*, 'Author's Response', in 'Review Symposia: Public Science', *Metascience*, 5 (1994), 24-30. See also S. Shapin and A. Thackray, 'Prosopography as a Research Tool', 4-5.

was a manifestation of this debate. Rather than seek ways to legitimate the new breed of 'scientists', Dick preferred to encourage cultivators or popularizers who linked science inextricably to a devotional theology of nature. Moreover, by forging unbreakable links between science and theology (a far better established and more deeply respected subject), Dick raised science's cultural status and thus the status of its cultivators or popularizers while also re-defining what it meant to study theology comprehensively and indeed the practice of Christian worship itself.

With a career as a 'scientist' ruled out, what courses of action did Dick recommend to Mackintosh? Becoming an itinerant lecturer was one option. Here the advice Dick offered revealed his own approach to scientific popularization. In preparing lectures for a general audience, he advised Mackintosh

to arrange your language & ideas in such a manner as will be the most perspicuous & interesting to a common audience... A purely scientific lecture... will seldom be listened to with interest by unscientific and untutored minds... [You will need] to obtain certain portions of apparatus for illustrating the topics of discussion [which are unfortunately expensive]... In this way, however, a taste for such pursuits might be gradually extended over the country; and, in proportion as a relish for such studies was promoted, would the prospect for employment & pecuniary compensation to the lecturer.<sup>22</sup>

Dick had previously observed in 1833 that, even in cities or towns of thirty or forty thousand people,

it frequently happens, that scarcely thirty or forty individuals can be collected to listen to instructions on such [scientific] subjects.... [while fees are sometimes too high] it is chiefly owing to the want of taste for such branches of knowledge ... arising from the want of intellectual instruction in early life. Even of the few who generally attend such lectures, there is not perhaps the one half who can enter with intelligence into the train of reasoning and illustration brought forward by the lecturer, or feel much interest in the discussions, excepting when their eyes are dazzled with some flashy experiment. Hence it follows, that very little knowledge comparatively can be communicated in this way...<sup>23</sup>

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<sup>22</sup>Dick to David Mackintosh, 22 Feb. 1836, NLS MS 584 no. 952.

<sup>23</sup>Dick, *Improvement of Society*, p. 395.

For Dick, rows of empty seats in the lecture hall were a clear sign of inadequate science education in the schools. This only served to buttress his call for an educational programme that would integrate the teaching of science into all levels of schooling. From this passage it also seems that Dick was irritated by exhibitionism and disappointed by those attenders who merely turned up to ogle his orrery.<sup>24</sup> He permitted himself the luxury of dreaming that there soon would be 'Courses of Lectures on Natural History, Philosophy, Astronomy, and General History, attended by thousands of anxious inquirers, instead of the tens which can now be induced to attend on such means of instruction'.<sup>25</sup>

Forewarned that itinerant lecturers would not always enjoy happy trails, Mackintosh was advised by Dick that he might instead seek to introduce in a village or town 'a system of Intellectual education, comprising not only the elements of Reading, Writing & Arithmetic, but also outlines, at least, of some of the most fascinating & popular sciences'. This would be difficult without public patronage, Dick admitted. Speaking from experience, he concluded that

The department of regular Teaching is perhaps that on which you could most permanently depend for subsistence, while, at the same time, you might have leisure for occasionally prosecuting scientific pursuits; and might likewise take opportunities, as openings occurred, for delivering popular lectures.<sup>26</sup>

While it is of course true that, the more young people Dick persuaded to embrace science, the more he enlarged the audience for science and perhaps the audience for his own lectures and books, such a considerate and detailed reply to a query from a young man he had never met also demonstrate quite well

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<sup>24</sup>On the various factors influencing audience receptivity at such lectures see I. Inkster, 'Public Lecture', 100-06, esp. 101.

<sup>25</sup>Dick, *Improvement of Society*, p. 402.

<sup>26</sup>Dick to David Mackintosh, 22 Feb. 1836, NLS MS 584 no. 952.

Dick's own benevolence and gentlemanly character.<sup>27</sup>

Mackintosh went forth and lectured very much within the comforting parameters of a God-praising theology of nature. One of his lecture tours provoked an interesting attack from the anti-Newtonian and inventor William Martin. Mackintosh 'says in his handbills', Martin observed drolly, 'that there can be no true philosophy except it agrees with Christianity. This is right enough ... but not so his suns without number, and coal being once forests of wood....' Martin, who tended to support a literal reading of Genesis, colourfully concluded that 'If they can produce no better men from the Scotch university than this lecturer, they had better shut them up in Edinburgh Castle, and let the soldiers stand sentry over them, to prevent them from running over the country exposing their pride and ignorance'.<sup>28</sup>

Martin's satirical and somewhat idiosyncratic attack was unusual but not unprecedented. It shows that even the pious theologies of nature espoused by Dick and Mackintosh, usually considered by most evangelicals to be edifying and reassuring to the general public, could be repudiated by those who tested knowledge claims by how well they conformed to strict readings of the Bible. Martin's attack reveals to us the disputes and disagreements which underlay the seemingly seamless process of the popularization of science.<sup>29</sup>

How did Dick's efforts to popularize science compare to those of other popularizers of his day, such as Hugh Miller and Mary Somerville? Clearly, his works were not original and substantial contributions to science, as were

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<sup>27</sup>On the social codes and behaviour displayed in scientific correspondence see A. Secord, 'Corresponding Interests: Artisans and Gentlemen in Nineteenth-century Natural History', *BJHS*, 27 (1994), 383-408, esp. 404-06.

<sup>28</sup>W. Martin, *The Defeat of the Noted Impostor MacIntosh [sic], the False Astronomer and Geologist* (Newcastle, 1842), p. 4. Mackintosh lectured in Newcastle on 18 Feb. 1842. On Martin see *DNB*, XII, 1186-87.

<sup>29</sup>On the problematic nature of popularization at this time, see R.R. Yeo, *Defining Science*, pp. 37-8, 47, 79, 84-7, 108.

Miller's writings on geology, nor were they rigorous distillations of the most current developments in science, as was Somerville's *On the Connexion of the Physical Sciences* (1834). If the latter might be termed 'high popularization' --distilling the most advanced developments in its field primarily for academics and advanced lay readers--Dick's works were more like Ray's and Derham's writings on science--combining a theology of nature with basic knowledge of the sciences and written 'in a popular manner' and 'adapted to the comprehension of general readers', as Dick himself put it.<sup>30</sup> In essence he was a missionary for a devotional form of science conceived as a way to mould the values of its recipients and to win converts to Christianity.

Here we see Dick's agenda of popularization embodied in his style of writing. Seeking to win the widest possible audience for his Christianized science, he strived for simplicity in his prose. However, while seeking to make his works accessible to all, he also sought to control the ways in which his readers read his works. He exerted this control by making his pious passages as 'natural' and unobtrusive as possible, and by repeatedly inviting his readers to join him in praising God's works. In fact it was more than an invitation, for in Dick's books these devotional utterances were depicted as the spontaneous and inevitable responses of devout Christians to God's works, the absence of which indicated an ungrateful or insensitive soul.

Many Christians found much to admire in Dick's approach. For example, James Robinson, Secretary of the Newcastle upon Tyne Evangelical Book Society, wrote that he and some other young men (mostly Sabbath school teachers) were working to promote 'the intellectual moral and spiritual well being' of society. These men asked Dick for copies of his books for their evangelical library. Then there was a Mr. S.P. Will, who wrote to Dick from Birmingham

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<sup>30</sup>Dick to T. Chalmers, 26 Nov. 1827, New College Library MS CHA 4.72.21-2.

that, upon the recommendation of his pastor, he wished to order twenty copies of the *Christian Philosopher* for young men to study at home after Saturday night classes in the chapel.<sup>31</sup> These letters raise important issues, such as how people incorporated their reading of Dick's texts into their lives, and the ways in which their reading was influenced by the places in which they read them. Certainly, in these cases Dick's devotional agenda struck a chord with Sabbath school teachers and ministers seeking to provide young men with edifying texts. Moreover, the places here in which these texts were read--in an evangelical library and in the home considered as an extended parish classroom--reinforced precisely those devotional qualities which Dick sought to inculcate. The meanings of Dick's texts, the places where they could be found, and the uses to which they were put: these are the issues which inform the remaining sections of this chapter.

## 6.2 Thomas Dick, his Publishers, and the Publishing History of his Works

As briefly mentioned in chapter two, Dick was almost shockingly obtuse in his financial dealings with his publishers. For his first five books (1823-35), Dick turned to William Collins in Glasgow. For his next three books (1837-40), he turned to Thomas Ward and Company in London. For his final book (not including the three tracts published by the Religious Tract Society between 1846 and 1851), he turned to Seeley, Burnside and Seeley in London. A closer look at Dick's dealings with his publishers, as well as related topics such as the price of his books, their format, how well they sold, and where and how they were advertised, will reveal much about the cultural context in which

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<sup>31</sup>J. Robinson to Dick, 27 Sep. 1842, NLS MS 9658 ff 72 R+V; S.P. Will to Dick, 18 Mar. 1843, NLS MS 9658 ff 84-5. Robinson wrote that his society had 'above 100 members and upwards of 150 volumes'.



Dick operated and his comparative success therein.<sup>32</sup> As such, this section is intended as a contribution to efforts currently under way into the history of books as cultural artefacts, created in the world of goods, whose meaning is not transparent but rather negotiated in a complex milieu that includes not only authors and publishers but also printers, binders, booksellers, reviewers, and especially readers.<sup>33</sup>

Dick initially attempted to sell his *Christian Philosopher* privately by subscription for five shillings, to be paid on delivery.<sup>34</sup> By September 1823, however, he was entertaining the idea of selling the copyright, with whatever copies he had left on hand, to a publisher. A friend wrote to him that a Mr. Griffin, a bookseller, had expressed an interest in his work, but that most booksellers 'are peevish and ungenerous', including Griffin in his own way, and that therefore he would probably have to work hard to obtain a fair value.<sup>35</sup> Later that year, Dick decided to turn to William Collins (1789-1853) as his publisher, with Whittaker<sup>36</sup> as his distributor in London.

An elder in the Tron church in Glasgow, Collins was instrumental in persuading Thomas Chalmers to come to Tron in 1815. They became close and

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<sup>32</sup>See also chapter one, section four. Throughout this section I am indebted to Jon Topham, whose advice and work have proved invaluable to my efforts.

<sup>33</sup>Since 1983 the American Antiquarian Society has run a Program in the History of the Book in American Culture and is currently at work on a multivolume series entitled *A History of the Book in America*. A similar project is underway at the University of Cambridge for the history of the book in Britain.

<sup>34</sup>'Proposals for Publishing by Subscription, an Original Work, intituled [sic], the *Christian Philosopher*; or, the Connexion of Science with Religion, by T. Dick', n.d. [c.1823], Lamb Collection, Dundee City Library. The printer of this advertisement was R. Morison in Perth.

<sup>35</sup>James Kennedy to Dick, 15 Sep. 1823, NLS MS 9658 ff 17-18.

<sup>36</sup>George Byrom Whittaker (1793-1847) was a London wholesale bookseller located in Ave Maria Lane. He published educational books and some popular works, including those of Frances Trollope and Sir Walter Scott's last novel.

lifelong friends. Collins actively promoted several evangelical causes, opening Glasgow's first local Sabbath school in 1815, lecturing on temperance from 1829 to 1834, and founding the British and Foreign Temperance Society in London in 1831. With financial support from Chalmers, Collins in 1819 began his publishing firm, known initially as Chalmers & Collins since the former had foisted his brother Charles on the firm (Charles soon grew bored and left in 1827). After the Disruption in 1843, Collins loyally followed Chalmers into the Free Church.<sup>37</sup>

Eleven letters between Collins and Dick survive today, but they are in private hands and I have been unable to locate the owner. Enough information from other sources is extant, however, to enable one to piece together a reasonably complete account of their dealings. Dick probably selected Collins as his publisher for two reasons: he was Chalmers's publisher, and he was well known for publishing works on theology (as in his 'Series of Christian Authors'). Perhaps Dick also felt comfortable working with a fellow evangelical Scotsman who had earlier been a schoolmaster. Collins certainly prospered most from their partnership. The proceeds he garnered from the extensive sales of the *Christian Philosopher* perhaps even saved his firm during an especially difficult stretch from 1825 to 1829.<sup>38</sup>

Sometime before 1827, Collins shrewdly purchased the copyright for the *Christian Philosopher* from Dick for £120. At first Dick may have been satisfied with this money, since it helped him to retire from teaching in 1827. Yet he would come to rue his decision as this work continued to be reprinted, reaching its tenth edition in 1846. That year, Dick, desperately

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<sup>37</sup>D. Keir, *The House of Collins: The Story of a Scottish Family of Publishers from 1789 to the Present Day* (London, 1952), pp. 26-155. See also S.J. Brown, *Thomas Chalmers*, pp. 145-46, 177. For a useful survey of Scottish publishers see R.D. MacLeod, *The Scottish Publishing Houses* (Glasgow, 1953).

<sup>38</sup>*Ibid.* (Keir), pp. 67-8.

short of funds, wrote that, with the exception of its first edition, the *Christian Philosopher* had passed through nine editions of 1500 copies each, and that Collins had cleared L1500 in profits on this work alone. Seven years later, he stated that in the interim it had passed through a further four or five editions of 1500 to 2000 copies each. From 1823 to 1853 the total number of copies sold, therefore, would have been 22,000 or thereabouts. Over these thirty years Dick estimated its sales had netted for Collins about L3000.<sup>39</sup>

With his next work, the *Philosophy of Religion*, it appears that Dick flirted with the notion of selling it by subscription as well, this time for seven shillings and sixpence per copy.<sup>40</sup> Perhaps finding fewer subscribers than he had hoped, he appears to have come to an agreement with Collins by September 1825. Strangely reluctant to modify his publishing arrangements, Dick sold outright to Collins the copyrights of this and his next three books.<sup>41</sup> For *Future State* (1828) he received L80, which he deemed 'a small trifle',<sup>42</sup> and one hundred copies of the first impression; for *Improvement of Society* (1833) he received L100; for *Mental Illumination* (1835) he received L130 (it is not known what he received for his *Philosophy of Religion*). All of these sold well. In 1846, Dick noted that both *Philosophy of Religion* and *Future State* had passed through four or five editions, each averaging 1500 copies, with the other two books reaching two or more editions of a similar size. It must have been scant solace indeed to Dick when the Reverend Henry Davies, writing from Penzance, commiserated with him, stating 'I have always

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<sup>39</sup> Statistics given in 'Statement in Relation to T.D.', 1846, DCA GD/x33/2/3; 'Statement to Royal Literary Fund', 20 June 1853, DCA GD/X33/2/5.

<sup>40</sup> 'Proposals for Publishing by Subscription, an Original Work, entitled, the *Philosophy of Religion*... by T. Dick', n.d. [c. May or June 1825], DCA GD/Mus 54/5. This notice was also printed by R. Morison in Perth.

<sup>41</sup> See DCA GD/Mus 54/9/8 i-v, 26 July 1849.

<sup>42</sup> Dick to T. Chalmers, 26 Nov. 1827, New College Library MS CHA 4.72.21-2.

regretted that you were so unfortunate as to have had any connexion with the Glasgow house [Collins], especially on the terms you felt it expedient to accept'. With a note of resignation, Davies wrote: 'I have heard it remarked that some persons are born with silver spoons in their mouth, and others with wooden ones. You my dear sir, and I, appear to belong to the latter fraternity'.<sup>43</sup>

The one letter which I have been able to locate from Collins to Dick shows that Collins was not one to mince words. With respect to *Future State*, Collins wrote Dick in 1828 that it

has not been much in demand either here or in England, and it has not excited great attention with those who have read it. The opinion however is decidedly favourable and the Reviewers have spoken in rather a laudatory strain of it. The general complaint is its similarity for a great part to the cares of preceding volumes, and the remark is frequently made that if Mr. Dick write any more Books he must change his subject entirely. My own opinion coincides very much with this.<sup>44</sup>

Collins's combination of measured praise with strong prodding probably played a significant role in Dick's decision to write less on theology and more on the diffusion of knowledge and social and educational reform in his next two books.

Why did Dick sell to Collins, at what were the equivalent of fire-sale prices, the rights to his first five books? Without additional evidence, this question cannot be answered definitively. By examining alternative publishing schemes which may have been open to Dick, however, one can perhaps approach an answer. Throughout most of the nineteenth century, books were commonly published under the 'half-profit' system. In this system, proceeds from sales initially went to meet a publisher's costs. If these were met, additional

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<sup>43</sup>H. Davies to Dick, 3 Sep. 1833, DCA GD/x33/1/10.

<sup>44</sup>Collins to Dick, 18 June 1828, DCA GD/X246/2.

profits were shared (not always equally) between publisher and author.<sup>45</sup> Assuming this system was an option for Dick, why did he not adopt it? For if he had, he would have earned perhaps L750 or even L1000 from sales of the *Christian Philosopher* alone.

My reading of this is that in 1827 or thereabouts, Dick found a lump-sum payment attractive because with it he could retire from teaching. He then got caught in a vicious circle. Because his pension, his only steady income, was a meagre L20 annually, his finances became strained (this was about the time of his first wife's death and his daughter Ann's adoption by an uncle, reputedly because of Dick's poverty). His straitened means effectively ruled out the initially risky, but potentially far more rewarding, option of the half-profit system. That his books would sell a sufficient number of copies to turn a handsome profit was a risk he could not afford to incur. His caution (assuming it was this) was not unwarranted. In the 1830s, only one book in fifteen paid for its own expenses.<sup>46</sup> The expediency under which Dick suffered, and which the Rev. Davies tactfully left unspecified in his letter, was financial. Dick was in essence compelled to opt for modest but sure gains. Thus he sold his copyrights, a decision which would plague his later years.

As editor of the *Educational Magazine* from 1835-36, perhaps Dick acquired more insight into the world of publishing. He does seem to have become slightly shrewder in negotiating more profitable agreements with his publishers. For his *Celestial Scenery* (1837), he turned to Thomas Ward and Company at No. 27 Paternoster Row in London. Publishers of the *Evangelical*

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<sup>45</sup> See P. Gaskell, *A New Introduction to Bibliography* (Oxford, 1972), pp. 298-300. On the often unequal sharing of profits between publisher and author, see S. Squire Sprigge, *The Methods of Publishing* (London, 1890), p. 107. For these sources I am indebted to Marten Hutt.

<sup>46</sup> J. Grant, *The Great Metropolis*, 2 v. (London, 1837), I, 134. For this source I am indebted to Jon Topham.

Magazine, Ward & Co. specialized in publishing sermons, devotional literature, educational texts, and ruminations on science and religion like those of Dick's friend, Robert Mudie. Here again Dick sold away his rights. However, he received £210 from Ward for *Celestial Scenery*, which would prove to be the highest payment that he would receive for any of his works.<sup>47</sup> Over the next six or seven years it passed through three editions of 2000 copies each.

With his next work, *Christian Beneficence* (1837), evidence suggests that Dick ventured to retain the copyright, perhaps because, with the proceeds from *Celestial Scenery* safely in hand, he could better afford to incur a risk. If he did, he would have received a percentage equal to 3s.3d. per copy sold by Ward.<sup>48</sup> Ironically, this was the least successful of his works.<sup>49</sup> In fact Dick stated that he retained the rights to one of his books, and that it proved a loss instead of a gain.<sup>50</sup> This almost certainly was a reference to *Christian Beneficence*. The terms of the agreement which he reached with Ward for his *Sidereal Heavens* in 1840 are not known.

With his last book, the *Practical Astronomer* (1845), came his most frustrating experience, especially in regards to the remuneration he received. For this work he turned to Seeley, Burnside and Seeley. Located at 54 Fleet Street in London from 1840 to 1884, the two Seeleys were Leonard Benton (d.1834) and his son Robert Benton (1798-1886).<sup>51</sup> The latter was also an author who wrote books with titles like *Essays on the Church* (1832), *Essays*

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<sup>47</sup> 'Statement in relation to T.D.', 1846, GD/x33/2/3.

<sup>48</sup> Mr. Ward to Dick, 17 Nov. 1838, NLS MS 9658 ff 31-2.

<sup>49</sup> Dick had hastily prepared this as an entry in a competition for a work showing the evils of covetousness. However, he submitted it too late to be judged, and when it was published it faced stiff competition from several similar books written on this same theme.

<sup>50</sup> 'Statement in relation to T.D.', 1846, DCA GD/x33/2/3.

<sup>51</sup> See 'The House of Seeley', *The Bookman*, 26 (1904), 13-17. This article merely states that their partner was a Mr. W. Burnside.

on *Romanism* (1838), *Perils of the Nation* (1844), and *Atlas of Prophecy* (1850). Seeley was one of the more prolific publishers of religious verse and issued many of the publications of the Church Missionary Society.<sup>52</sup> In fact all three of Dick's publishers, and of course the Religious Tract Society, specialized in theological works and Christian literature. This provides yet another reminder that Dick saw himself as a Christian philosopher who placed religious concerns first.

According to Dick, of his nine books, the *Practical Astronomer* 'cost him more labour than any of the rest'. It was ready for publication in 1842, but Seeley delayed publishing it for three years, apparently because they thought the book trade too weak to support it (this was a time of general economic depression). In 1845, after his letters went unanswered, Dick had to employ an intermediary to visit Seeley in his stead to enquire as to the status of his book. In a letter to G.P. Putnam in New York,<sup>53</sup> the publisher of an American edition of this work, Dick apologized for the delay in sending him the sheets he needed for publication. Placing the blame squarely on Seeley, he lamented that he had never before encountered such difficulties with a publisher.<sup>54</sup> His finances strained to the breaking point by the five grandchildren he and his wife had had to adopt in 1842, Dick sold his rights to the *Practical Astronomer* to Seeley for a paltry fifty guineas (£52.10s.) and fifty copies gratis. By comparison, a mediocre novelist in the 1840s regularly earned £250 per book.<sup>55</sup> In its first edition the *Practical Astronomer* sold 2000 copies. By the early 1850s, it had reached a second

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<sup>52</sup>R. Scott, 'Pious Verse in the Mid-Victorian Market Place: Facts and Figures', *Publishing History*, 33 (1993), 37-58: 52-54.

<sup>53</sup>On George Palmer Putnam (1814-72) see *DAB*, XV, 279-80.

<sup>54</sup>Dick to G.P. Putnam, 1 Nov. 1845, NLS Acc 10817.

<sup>55</sup>T.W. Heyck, *Transformation of Intellectual Life*, p. 28.

edition.

Dick's last literary efforts came in the form of three shorter works--the *Solar System* (1846), the *Atmosphere* (1848), and the *Telescope & Microscope* (1851)--which he composed for the Religious Tract Society (hereafter RTS). Founded in 1799, the RTS published literature which its middle-class and evangelical founders and writers deemed suitable for the lower classes.<sup>56</sup> Twenty letters exist between Dick and the RTS, discussing terms for an agreement, topics for publication, and related issues, but these letters are privately owned and I have not been able to locate the owner. Without these letters, a detailed analysis of Dick's relationship with the RTS is impossible. From standard sources on the RTS, however, some details relevant to Dick's efforts may be garnered.

In its first four decades, the RTS published works dedicated almost exclusively to the agreed upon 'basics' of evangelicalism. The Society avoided both contentious religious doctrines, especially those connected with sectarian disputes, and secular subjects, which some of its benefactors saw as distractions from the overriding goal of showing people the way to salvation.<sup>57</sup> By the early 1840s, however, the RTS began to consider publishing tracts on secular subjects. In a sense, the RTS adopted a course of action which Dick had earlier recommended in 1825:

were a proper selection made of facts connected with the system of nature, and with the history and the present state of human society, and were the sketches of such facts executed by the hand of a master, and

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<sup>56</sup>On the RTS see D.R. Knickerbocker, 'The Popular Religious Tract in England 1790-1830' (Oxford Univ. D.Phil. 1981); R.K. Webb, *British Working Class Reader*, pp. 26-28; R.D. Altick, *English Common Reader*, pp. 100-08; J. Feather, *History of British Publishing*, pp. 161-62.

<sup>57</sup>D.R. Knickerbocker, 'Popular Religious Tract', pp. 158-60, 168-71, 233-51, 337-57. Knickerbocker notes that officers of the RTS constantly had to explain, in apologetic tones, why they had felt it necessary to publish the Hawkers Series of tracts, which focused less on salvation and more on morality and conduct. This series excepted, he concludes that the RTS's tracts changed little in form, style or content from 1800 to 1830.



interspersed with rational and moral reflections--volumes might be presented to the public, no less entertaining, and certainly far more instructive, than all the novels and romances which the human imagination has ever produced.<sup>58</sup>

The Society first approached Dick in 1844, the same year, interestingly, as *Vestiges of a Natural History of Creation* appeared. Inaugurating a series of 'Monthly Volumes' in 1845, the Society declared that these 'combin[ed] general information with religious sentiments, and [were] adapted to the new development and growing intelligence of the times'. They were advertised as 'SCRIPTURAL; in the principles in which they are written:--POPULAR; in their style:--PORTABLE; that they may serve as "hand-books" abroad and at home: and ECONOMICAL....' The Society specifically commended them to Sunday-schools and the libraries of mechanics. Volumes on such diverse subjects as Julius Caesar and eminent medical men appeared at regular monthly intervals between 1845 and 1854. One hundred volumes were eventually published in this series.<sup>59</sup>

Dick's *Solar System*, published in two parts as volumes six and nine of this series, sold respectively 30,510 and 26,890 copies by 1850, making them the second and fourth highest sellers in the series up to that time. The best selling volume, the *Philosophy of the Plan of Salvation*, sold 38,595 copies; in third place was a volume on *Wild Flowers*, which sold 30,060 copies.<sup>60</sup> Only four other volumes had sold more than 20,000 copies by 1850.<sup>61</sup> Taken

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<sup>58</sup>Dick, *Philosophy of Religion*, p. 383.

<sup>59</sup>On this series see W. Jones, *The Jubilee Memorial of the Religious Tract Society: Containing a Record of its Origins, Proceedings, and Results* (London, 1850), pp. 147-48 and p. 3 of an appended list of 'Publications of the Religious Tract Society'; S.G. Green, *The Story of the Religious Tract Society for One Hundred Years* (London, 1899), pp. 53-4; G. Hewitt, *Let the People Read: A Short History of the United Society for Christian Literature* (London, 1949), p. 51.

<sup>60</sup>W. Jones, *Jubilee Memorial*, Appendix V, 'Issue of the Monthly Volumes which have exceeded 10,000 Copies', n.p.

<sup>61</sup>These were Julius Caesar (25,623), *Dark Ages* (25,886), *Ancient Jerusalem* (22,050), and *Modern Jerusalem* (20,255).

together, Dick's *Solar System* represented a major publishing coup for the RTS, which perhaps explains why it was translated into Welsh and Chinese. This work, along with Dick's two other tracts, the *Atmosphere and Telescope & Microscope*, opened a vast new reservoir of readers both for the RTS<sup>62</sup> and for Dick. As we shall see, the Welsh slate loader and amateur astronomer John Jones first encountered astronomy by reading Dick's *Solar System*. Interestingly, Jon Topham owns a copy of this work which was given as a Sunday school prize.<sup>63</sup> These are only two instances of the considerable influence these tracts must have enjoyed.

While none of Dick's books attained bestseller status (in fact only three scientific works became bestsellers between 1800 and 1850),<sup>64</sup> all of his books reached at least a second edition, with the *Christian Philosopher* reputedly reaching at least twenty-two editions in forty years. At a time when only one in 200 books reached a second edition, only one in 500 reached a third, and only one in 1000 reached a fourth, this was indeed an admirable record.<sup>65</sup> The sizes of the editions of Dick's books were also impressive. Most of his books were printed in editions of between 1500 and 2000 copies each. As Jon Topham has noted, in the 1830s and 1840s an edition of 1000

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<sup>62</sup>In 1852, the RTS founded a journal which contained 'information on literary, scientific, and general subjects... in a religious spirit'. Dunkin's astronomical maps appeared in this, along with articles on science written by James Glaisher and Sir William Dawson. See Anon., *The Story of the Religious Tract Society* (London, 1898), pp. 18, 20.

<sup>63</sup>Personal communication.

<sup>64</sup>These three were G. Combe's *The Constitution of Man* (1828), which was heavily subsidized after 1835; W. Buckland's *On Geology and Mineralogy* (Bridgewater Treatise, 1836); and R. Chambers's *Vestiges of the Natural History of Creation* (1844). See R.D. Altick, *English Common Reader*, Appendix B, 'Best-Sellers'; idem, 'Nineteenth-century English Best-sellers: A Further List', *Studies in Bibliography*, 22 (1969), 197-206; idem, 'Nineteenth-century English Best-sellers: A Third List', *Studies in Bibliography*, 39 (1986), 235-41.

<sup>65</sup>J. Grant, *The Great Metropolis*, I, 134.

copies of a moderately-priced book was considered large. Print runs, especially of works of science, which were not normally expected to fly off booksellers' shelves, were typically kept small (500 copies or fewer) to economize on the high cost of paper.<sup>66</sup>

The numerous editions and large print runs of Dick's works demonstrate their popularity, at least in terms of sheer numbers of books sold. But who bought his books? The obvious answer is the reading public, which consisted largely of the middle-classes (merchants, bankers, factory owners) and professionals, along with a growing number of skilled artisans and petty bourgeoisie (small shopkeepers, clerks, and so on).<sup>67</sup> To answer this question with more precision, one must first examine who could afford to buy Dick's books. Table 6.1 (next page) lists the prices at which Dick's books sold, along with their format and publisher.<sup>68</sup>

While Dick, as he himself put it, aspired to reach both 'the middle and lower ranks of the community', until the mid-1840s, only affluent members of the middle and higher classes would have been able to afford to purchase routinely his books. The same was true for the somewhat more expensive *Bridgewater Treatises*, which, with the exception of Whewell's treatise (available at 6s. after 1837), were priced between 9s.6d. and £1.15s. until the 1850s, when they became part of Bohn's Scientific Library at 3s.6d.<sup>69</sup>

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<sup>66</sup>J. Topham, 'An Infinite Variety of Arguments', ch. 5, 'The Readership of the *Bridgewater Treatises*', esp. sect. 5.1, 'Publication History'.

<sup>67</sup>T.W. Heyck, *Transformation of Intellectual Life*, pp. 20-1; R.D. Altick, *English Common Reader*, pp. 82-3.

<sup>68</sup>Compiled from R.A. Peddie, ed., *The English Catalogue of Books, 1801-1836* (London, 1914); *The English Catalogue of Books Published from January, 1835, to January, 1863* (London, 1864), pp. 203, 882, 885. Since it was Dick's publishers who owned the rights to his books, it was probably they who set prices and settled questions on format.

<sup>69</sup>J. Topham, 'Science and Popular Education', 400. The sole exception provided by Whewell's treatise seems to have come about at Whewell's prompting.

Table 6.1 Publishing Data for Thomas Dick's Works

Title of Book	Price and Year	Format	Publisher
Christian Philosopher	7s. in Oct. 1823	12mo.	Whittaker
Philosophy of Religion	9s. in Feb. 1826	12mo.	Whittaker
Future State	6s.6d. in Jan. 1828	12mo.	Whittaker
Improvement of Society	7s.6d. in May 1833	12mo.	Whittaker
Mental Illumination	6s. in Dec. 1835	12mo.	Collins
Celestial Scenery	10s.6d. in 1838	12mo.	Ward & Co. <sup>70</sup>
Sidereal Heavens	10s.6d. in 1840	12mo.	Ward & Co.
Practical Astronomer	10s.6d. in 1845	12mo.	Seeley
Solar System (pt.1)	1s.6d. in 1846	18mo.	RTS*
Solar System (pt.2)	1s. in 1852	18mo.	RTS*
Atmosphere	1s.6d. in 1848	18mo.	RTS*
Telescope & Microscope	1s.6d. in 1851	18mo.	RTS*

\*The RTS advertised these in a cheap binding (variously described as a 'fancy', 'glazed' or 'neat' cover), at 6d., and in cloth boards with gilt-edged pages for 2s. Double volumes were 1s.6d. each. Parts 1 and 2 of Dick's *Solar System* made such a double, and his *Atmosphere* and *Telescope & Microscope* were also sometimes bound together.

Certainly, it was a rare mill-worker in Dick's hometown of Dundee who could have afforded one of his works. In 1833, average weekly wages in Dundee's mills ranged from 3s. to 6s. for girls and boys, 5s. to 8s. for women, 7s. to 10s. for weavers, 10s. to 12s. for flax-dressers, and 14s. to 18s. for mill-wrights.<sup>71</sup> Even for a skilled artisan making £60 a year, nine or ten shillings represented more than two days' wages. A sobering reminder is that this same amount would have bought more than a week's worth of food for one person.

A few of the thriftiest or most parsimonious of workers may have been able to squirrel away enough shillings here and there to enable them eventually to purchase a book. Such dedication and severe self-discipline was demonstrated by Alexander Somerville. Earning 6s. a week as an unskilled

<sup>70</sup> See advertisement, 1838, NLS MS 9658 ff 31-2.

<sup>71</sup> Dundee in 1793 and 1833: the *First and Second Statistical Accounts* (St Andrews, Fife, 1991), p. 91. See also A. Wilson, *The Chartist Movement in Scotland* (Manchester, 1970), ch. 1, 'The Social Background of Scottish Chartism'.

labourer, he put himself on a meagre diet, which cost him 4s. or sometimes 3s.6d. a week, and spent what money remained 'on books, stationery, newspapers, and postage of letters'. In his autobiography, he treats a single book purchase as a noteworthy item, as no doubt it was, given the sacrifice it represented to him.<sup>72</sup> The number of workers possessing Somerville's determination and discipline, however, must have been exceedingly small. Yet less thrifty workers had other options, the most important (discussed in the next section) being libraries at mechanics' institutes.

From table 6.1 it is interesting to note that Collins and Whittaker were nearly always able to keep the price of Dick's first five works between 6s. and 7s.6d. a copy. With books selling at an average price of 12s.1d. a copy in 1828,<sup>73</sup> this is quite low and is attributable primarily to their being published in a comparatively cheap, duodecimo, format. These prices compared favourably to *The Naturalist's Library*, a forty-volume series published from 1833 to 1843. Sold at 6s. per volume, it was expected that this price would place the series within the reach of all but the least prosperous of the middle classes.<sup>74</sup>

And yet, by purchasing Dick's copyrights for comparatively low sums, Collins was perhaps better able to sell these books at lower prices. He was under no obligation to share profits with Dick; therefore, it would have been entirely to his advantage to try to enlarge his profits through volume sales. It is ironic that Dick, in negotiating unfavourable agreements with his publishers, may have enabled them to sell his works at prices which were more affordable to workers. The higher price of his three books on astronomy,

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<sup>72</sup>A. Somerville, *Autobiography of a Working Man*, p. 151.

<sup>73</sup>R.D. Altick, *English Common Reader*, p. 286.

<sup>74</sup>S. Sheets-Pyenson, 'War and Peace in Natural History Publishing: *The Naturalist's Library, 1833-1843*', *Isis*, 72 (1981), 50-72: 51.

which sold for a half guinea each, was probably attributable to the added costs associated with their engravings and woodcuts.

With the introduction of the steam press and other new technologies for publishing,<sup>75</sup> less expensive editions of Dick's works became available in the latter half of the 1840s and 1850s. In Collins's Cheap Series, published under the name of Griffin, cloth-lettered books (sometimes slightly abridged) sold for 2s., with sewed copies at 1s.6d. Together with Dick's similarly-priced efforts for the Religious Tract Society, these would have been affordable, if still not routine, purchases for most workers. There were at least fifty-seven books in Collins's series. Dick's *Christian Philosopher* was books 7 and 8; *Philosophy of Religion* was book 14; *Future State* was book 17; and *Improvement of Society* was book 24. Also appearing under the Griffin name for two shillings were *Mental Illumination* and *Christian Beneficence*. Ward and Company, who owned the copyrights to *Celestial Scenery* and *Sidereal Heavens*, made cheaper editions of these available in 1848 at 5s.6d. per copy.<sup>76</sup>

Along with price, the physical form of books also provide clues as to their cultural status. Size, number of pages, quality of paper and binding, typeface and illustrations--all may be redolent of meaning. In the case of the *Bridgewater Treatises*, Jon Topham has noted how their publisher, William Pickering, built his reputation by publishing quality books. Published in demy octavo, with wide margins, quality paper, and a large typeface, the *Bridgewater Treatises* were suitable products for the landed, mercantile, and professional classes and were often re-bound in calf or some other high-quality binding. In contrast, Dick's works were in every way inferior. Most

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<sup>75</sup>Summarized quite well in S. Sheets-Pyenson, 'War and Peace', 52, 61-2, 70. See also M. Plant, *The English Book Trade: An Economic History of the Making and Sale of Books*, 3rd ed. (London, 1974), esp. pp. 269-85.

<sup>76</sup>Ward to Dick, 1848, NLS MS 9658 ff 111.

commonly published in twelvemo (duodecimo) format, they were smaller (typical page dimensions were 4-1/8 x 7 inches, as compared with 5 x 8-1/4 inches for the *Bridgewater Treatises*), with narrower margins, thinner paper, and a smaller typeface. They did offer more bulk--Dick's works each averaged about 500 pages--but sheer number of pages was perhaps most attractive to cost-conscious or bargain-hunting members of the middle classes. In their physical form, Dick's works would seem typical of those books intended for middle-class readers who, in discriminating by number of pages and amount of information crammed therein, wanted fair value for their shillings and pence.

With respect to advertising, the limited information that I have uncovered supports the reading that the audience targeted by Dick and his publishers was primarily a middle-class one. In 1824, the *Christian Philosopher* was advertised in the *Evangelical Magazine* and on the covers of the *Literary Magazine* (for which Dick's agent, the Edinburgh bookseller James Robertson, claimed a very great circulation) and the *Monthly Magazine* (per Dick's request).<sup>77</sup> In 1833, Collins advertised this work as a 'suitable' Christmas present for children. When in 1835 Collins published Dick's *Mental Illumination* and advertised it as 'suitable' for children, the future Lord Macaulay apparently thought this 'quite absurd'.<sup>78</sup> With these advertisements Collins was most likely targeting middle-class parents who were concerned about their children's education and piety. In 1856, Dick suggested that the latest edition of his *Christian Philosopher* should be advertised 'in

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<sup>77</sup> J. Robertson to Dick, 2 June 1824, DCA GD/X33/1/5.

<sup>78</sup> It was not quite as absurd as he believed. Though Dick wrote this book for parents, teachers, and educational reformers, one might imagine more advanced children reading it, with help from a parent or teacher. For Macaulay's sentiment see D. Keir, *House of Collins*, p. 111.

the Atheneum and similar works'.<sup>79</sup> The Athenaeum (circulation 7200 in 1854)<sup>80</sup> was a Whig periodical which contained literary notices, book reviews, and intelligence on science and the fine arts.<sup>81</sup> It was solidly middle-class, as were the other aforementioned periodicals.

In summary, while Dick was less than successful in negotiating contracts with his publishers, his works themselves, taken collectively, were hugely successful. They proved popular and palatable mediums for the diffusion of Christianized knowledge, important precisely because of their popularity. Their intended audience was the largely middle-class, reading public who could afford to purchase them. Yet Dick also worked strenuously to reach the lower orders, including both skilled and unskilled workers and domestic servants. It is with this audience that library studies can prove highly enlightening, as the next section seeks to show.

### 6.3 Dick's Works in Mechanics' Institutes and other Libraries

In recent years historians have turned to studies of readership to measure the cultural penetration and significance of books, periodicals, and other forms of printed matter.<sup>82</sup> Through library studies, one can measure the

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<sup>79</sup>Dick to James Blackwood, 21 May 1856, in 'Scrapbook of James Blackwood, Publisher including many letters addressed to him', Duke Humphrey's Library, Oxford, MS Eng Misc C 334, f148.

<sup>80</sup>T.W. Heyck, *Transformation of Intellectual Life*, p. 33.

<sup>81</sup>On *The Athenaeum* and its role in popularizing science in Victorian society see L.A. Marchand, *The Athenaeum: A Mirror of Victorian Culture* (Chapel Hill, 1941), esp. pp. 52-4.

<sup>82</sup>A. Ellegård's 'The Readership of the Periodical Press in Mid-Victorian Britain', *Göteborgs Universitets Arsskrift*, 63 (1957), 1-41, and his *Darwin and the General Reader: The Reception of Darwin's Theory of Evolution in the British Periodical Press, 1859-1872* (Göteborg, 1958) pointed the way. More recent studies include G.S. Rousseau, 'Science Books and their Readers in the Eighteenth Century', in I. Rivers, ed., *Books and their Readers in Eighteenth Century England* (Leicester, 1982), pp. 197-255.



availability of a person's works, whether some of their works were more often stocked than others, whether there existed regional, denominational, or other variations in their distribution, and similar issues of readership.<sup>83</sup> As we have seen, while Dick endeavoured to reach the lower classes, for the vast majority of workers his books, at least until about 1846, would have been prohibitively expensive. Workers interested in reading Dick's books would most likely have turned to libraries at Sunday schools<sup>84</sup> or at mechanics' institutes.<sup>85</sup> An example drawn from each of these types of libraries will show how library copies served to expand readership in dramatic ways. As a young teenager with an ardent interest in books, Charles Shaw, son of a poor painter and gilder, turned to his local Sunday school library in Tunstall, Stoke-on-Trent. Here he discovered and read Dick's *Christian Philosopher*, about which he wrote:

This book was a real charm and inspiration. Scientific matters were put before me with such new vividness and interest... Nature, from sods to stars, became to me a temple. The religious tone of the book entranced, and the sublimities of the heavens which it unfolded awoke in me imaginings which thrilled my soul.<sup>86</sup>

Shaw later became a Primitive Methodist lay preacher. In preparing for his ministry, he confessed:

My theological studies were somewhat bewildering and uninforming. I am

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<sup>83</sup> I have found most useful the work of Jon Topham, 'An Infinite Variety of Arguments', ch. 5, 'The Readership of the Bridgewater Treatises'; idem, 'Science and Popular Education in the 1830s'; and the work of Marten Hutt on 'Libraries, Doctors and the Readership of Medical Biographies', in 'Medical Biography and Autobiography in Britain, c. 1780-1920' (Oxford Univ. D.Phil. thesis 1995), pp. 174-251.

<sup>84</sup> By 1840, between one-half to three-quarters of Sunday schools in urban areas, and perhaps one-quarter in rural locations, had libraries. See T.W. Laqueur, *Religion and Respectability: Sunday Schools and Working-class Culture, 1780-1850* (New Haven, 1976), pp. 117-18.

<sup>85</sup> On the growth of libraries see T. Kelly, *Early Public Libraries: A History of Public Libraries in Great Britain before 1850* (London, 1966), esp. pp. 185-240.

<sup>86</sup> C. Shaw, *When I Was a Child, by an Old Potter* (London, 1903), p. 219.

afraid I learnt more in this direction from Milton's *Paradise Lost* and *Paradise Regained*, and Dick's *Christian Philosopher*, and Gilfillan's *Bards of the Bible*. My theology therefore was made up of a very curious blend. It had less dogma in it than imagination and rhetoric.<sup>87</sup>

Dick's *Christian Philosopher* plainly shaped Shaw's life. As a teenager, it inspired him to see nature as God's temple, and as an adult it moulded his approach to theology. Another of Dick's works, his *Sidereal Heavens*, appears to have shaped the thought of Emily Brontë. She would have found this volume in Keighley's Mechanics' Institute, from which she and her sisters borrowed books. It may have persuaded her of a plurality of worlds, a belief she exhibited in her poetry.<sup>88</sup>

Indeed, libraries at Sunday schools and mechanics' institutes were often of tremendous importance in individuals' lives. Focusing on the latter, W. Hawkes Smith, a leading member of Birmingham's mechanics' institute, noted in 1835 that, 'It is the classes and the library--the unobtrusive--the unglittering portions--which form the really--the profoundly beneficial characteristics of such institutions'.<sup>89</sup> Typically, establishing a library was the single most expensive task for mechanics' institutes, and one that often proved essential for wooing and recruiting members.<sup>90</sup>

Scrutinizing the library catalogues of these institutes requires caution, however. Mechanics' institutes tended to follow a somewhat haphazard and inefficient process for acquiring books. Many books were donated, leading to unwanted duplication. Moreover, a surprisingly large number of (donated?)

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<sup>87</sup> *Ibid.*, p. 236.

<sup>88</sup> Dick's possible influence on Emily Brontë is documented in V. Cronin, *The View from Planet Earth: Man Looks at the Cosmos* (London, 1981), pp. 181, 320. Cronin observes that the only other book on astronomy at Keighley--R. Mudie's *The Heavens* (1835)--did not teach the plurality of worlds.

<sup>89</sup> Quoted in E. Royle, 'Mechanics' Institutes', 308.

<sup>90</sup> J. Topham, 'Science and Popular Education', 407-13.

works of fiction appear in some catalogues.<sup>91</sup> Omissions in these catalogues, moreover, may signify far more than lack of interest; they could, for example, reflect highly localized disagreements in regards to educational philosophy. Nevertheless, when used with sensitivity these catalogues remain invaluable sources in studies of readership.

From his detailed and comprehensive study of libraries at fifteen separate mechanics' institutes, Jon Topham has noted that Dick's works were among the most often found at these institutes.<sup>92</sup> A perusal of five library catalogues of mechanics' institutes not examined by Topham supports his conclusion. Table 6.2 summarizes the holdings of these libraries.<sup>93</sup>

**Table 6.2 Dick's Works in Five Mechanics' Institutes**

Location/Name	Titles (Year Acquired)	Date of Catalogue	# of Books in Library
Banbury	None	1836	?
Gateshead	CP (1834), IS (1836), CS (1838)	1842	1730
Great West. Rail.	CP, FS, SS	1888	?
Hull	CP, PR, FS, IS, MI, CS, SH	1839	2230
Lewes	None	1839	1593

Key to abbreviations: CP: Christian Philosopher; PR: Philosophy of Religion; FS: Future State; IS: Improvement of Society; MI: Mental Illumination; CS: Celestial Scenery; SH: Sidereal Heavens; SS: Solar System.

<sup>91</sup>On the haphazardness of mechanics' institute libraries see R.D. Altick, *English Common Reader*, pp. 198-99; and D.A. Hinton, 'Popular Science', pp. 224-5, 234-7, 253.

<sup>92</sup>J. Topham, 'Science and Education', Table 1, 409. Similar 19th-century works which appeared with equal frequency in these libraries include Paley's *Natural Theology* (1802), John Bird Sumner's *Treatise on the Records of Creation* (1816), Chalmers's *Discourses on Astronomy* (1817), and Henry Duncan's *Sacred Philosophy of the Seasons* (1836-37). J. Topham, 410, fn. 62.

<sup>93</sup>A *Catalogue of the Library of the Banbury Mechanics' Institution, with the Bye-Laws for the Regulation of the Library* (Banbury, 1836); *The Arranged Catalogue of the Library of the Mechanics' Institute, or Literary and Scientific Society of the Borough of Gateshead* (Gateshead, 1842), pp. 24, 26-7; A.J. Birch, comp., *Great Western Railway Mechanics' Institution, New Swindon. Catalogue of Books* (Swindon, 1888), pp. 74, 324, 367; *Catalogue of Books in the Library of the Hull Mechanics' Institute* (Hull, 1839), pp. 19, 28, 45, 48, 51, 67, 69; *Laws of the Lewes Mechanics' Institution, for the Promotion of Useful Knowledge among the Working Classes. Established November, 1825. With the Regulations adopted by the Committee of Management, and Catalogue of its Library* (Hailsham, 1839).

Dick's works did not appear in libraries at Banbury and Lewes, yet three each appeared at Gateshead and Great Western Railway, and seven appeared in the library at Hull (only Dick's *Christian Beneficence* was missing). It might be immediately noted that, although Dick complained that mechanics' institutes too assiduously avoided religion, in an otherwise commendable attempt to avert sectarian squabbles, the fact that his (and other) essentially devotional and apologetic works were commonly stocked in these libraries demonstrates that mechanics' institutes valued uncontentious and non-doctrinal works on religion and natural theology. Such books reflected the generally prevailing view that studies of nature led naturally to worship of God. By stocking these books, mechanics' institutes transmitted and reinforced Christian values.

As mentioned previously, there was no one set of guidelines which mechanics' institutes followed in purchasing books. However, for those looking for guidance, two hand-books were available. Dick's works were not listed in the first of these, B.F. Duppa's *Manual for Mechanics' Institutes* (1839), published under the auspices of the SDUK. Jon Topham has noted that Duppa listed only six works of natural theology, including, as one would expect, works by Brougham, Charles Bell, and Peter Mark Roget, who were of course founding members of the SDUK.<sup>94</sup> Although none of Dick's works were specifically recommended in the first edition of W.H.J. Traice's *Hand-book of Mechanics' Institutions* (1856), Traice did commend Collins's cheap series of books and the monthly volumes of the RTS. Dick's works were featured in both of these series. In the revised edition of his handbook (1863), Traice did specifically recommend Dick's *Celestial Scenery* and *Sidereal Heavens* as well as his *Solar System*. It would appear that the former two were added after

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<sup>94</sup>J. Topham, 'Science and Education in the 1830s', 408. He suggests that perhaps the SDUK was beginning to shy away from natural theology because it was increasingly seen by workers to be tainted by the rhetoric of paternalism.

Ward & Lock became one of the many publishers to supply a catalogue to Traice.<sup>95</sup> It is thus difficult to draw any conclusions from Traice's recommendations, other than to note that Dick's works on astronomy, classed under 'Natural and Experimental Philosophy', were well represented.

A perusal of two other library catalogues confirms the widespread distribution of Dick's works:<sup>96</sup>

Table 6.3 Dick's Works in Other Libraries

Location/Name	Type of Library	Titles (Year Acquired)	Date of Catalogue
Kingston-upon-Hull	Lyceum	CP (1828), PR (1830) IS (1833), MI (1835)	1836
Nisbet's (London)	Theological/ Circulating	CP, PR, FS (by 1832) IS, CS, SH (by 1841)	1832 1841

Hull's Lyceum had acquired four of the five books Dick had published up until 1836, and Nisbet's circulating library had acquired six of the eight published up until 1841. That both of these libraries acquired Dick's books soon after they were published indicates that these libraries had knowledge of, and considerable interest in, these works.

Dick's books could also be found in places where more rigorous works of science were not taken up. Jon Topham has noted that no *Bridgewater Treatises* appeared on the shelves of religious libraries in Leeds, but many of Dick's works did, along with Paley's *Natural Theology*, James Hervey's *Meditations and Contemplations*, Christian Sturm's *Reflections on the Works of God*, and John

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<sup>95</sup>B.F. Duppa, *A Manual for Mechanics' Institutes* (London, 1839), Appendix II, 'Catalogue of [recommended] Books', pp. 169-95; W.H.J. Traice, *Hand-book of Mechanics' Institutions, with Priced Catalogue of Books suitable for Libraries* (London, 1856; 2d. ed., rev., 1863), pp. 56-8.

<sup>96</sup>A *Catalogue of the Lyceum Library, at Kingston-upon-Hull* (Hull, 1836), pp. 3, 8; *Catalogue of James Nisbet's Select Theological Circulating Library. [With] Appendix* (London, 1832, 1841), pp. 177-78; Appendix, p. 42.

Pye Smith's *On the Relation between the Holy Scriptures and some parts of Geological Science*. Samuel Brown's travelling libraries in East Lothian also stocked mainly theological works, especially books on current points of controversy and on prophecy and Revelation. In a list of new books for subscribers to these libraries, Dick's *Christian Philosopher* was commended in 1826-27 as 'an interesting application of the discoveries of science to the excitement of religious feeling'.<sup>97</sup>

Perhaps the clearest sign of the moral sobriety, marketability, and cultural penetration of Dick's works was their inclusion in the pages of Mudie's catalogue. Founded in 1842, Charles Mudie's Select Circulating Library became by far the largest and most popular of Victorian circulating libraries, with 25,000 subscribers by 1860. Its annual subscription fee of a guinea (compared to two guineas for most other circulating libraries) marked it as a middle-class establishment.<sup>98</sup> As one author claimed, 'if you want to know the real English reader, man or woman, particularly the reader of London society and the London middle classes, you must go and ask Mudie'.<sup>99</sup> In judging whether a book merited inclusion in his library, Mudie wielded considerable power. A man of strong evangelical and non-conformist sympathies who also preached and wrote hymns, Mudie at times excluded books for moral reasons.<sup>100</sup> Five of Dick's books were stocked by Mudie's: his *Christian Philosopher*, *Future State*, *Celestial Scenery*, *Sidereal Heavens*, and *Practical*

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<sup>97</sup>L.J. Saunders, *Scottish Democracy 1815-1840*, pp. 254-55.

<sup>98</sup>R.D. Altick, *English Common Reader*, pp. 216-19.

<sup>99</sup>J. Milne, 'Mudie's: The Diamond Jubilee of a Great Library', *The Strand Magazine*, 58 (1919), 138-42: 138. My thanks to Marten Hutt for this reference.

<sup>100</sup>G.L. Griest, *Mudie's Circulating Library and the Victorian Novel* (Newton Abbot, 1970), pp. 18, 33, 98.

Astronomer.<sup>101</sup>

Although the portrait which emerges from these library studies is impressionistic, it is clear that Dick's works were commonly stocked by mechanics' institutes, circulating libraries, and other libraries. This does not necessarily mean they were borrowed or read extensively. Library registers would serve to answer the former question, but few survive from this period. And registers cannot tell us why a person borrowed a book, or how they read it, whether cursorily or closely or some manner in between. However, from the personal examples provided by Shaw and Brontë and cited at the beginning of this section, it is evident that readers did borrow Dick's works and that some were profoundly affected by them. The next section further explores the effects which Dick's books had on individual readers.

#### 6.4 From Magus to Mentor: Individual Responses to Thomas Dick

Readers are not passive receivers of knowledge; rather, they are active consumers, translators and interpreters of knowledge, adopting and discarding, adapting and re-writing, what they read.<sup>102</sup> This section examines how individual readers responded to Dick, the conclusions which they drew from his writings, and the ways in which they employed in their own lives the knowledge they said they had acquired from Dick's books. Dick obviously could not control completely the ways in which readers read his books; as we shall see, the effects of his books were decidedly not foreseeable and were at times

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<sup>101</sup> *Catalogue of New and Standard Works, in Circulation at Mudie's Select Library* (London, 1861), p. 43.

<sup>102</sup> I have found most useful here the work of Jon Topham, especially his paper 'Beyond the "Common Context": The Readership of the *Bridgewater Treatises*', presented at the conference on 'Science and British Culture in the 1830s', Trinity College, Cambridge, 6-8 July 1994. See also chapter one, section four.

quite remarkable.

Surely the most famous of Dick's disciples was the famed explorer and failed missionary David Livingstone (1813-73). Born in a Glasgow workers' tenement in Blantyre, Lanarkshire, Livingstone was eking out an existence as a piecer-boy in a cotton mill when he came across Dick's *Philosophy of Religion and Future State*. These 'fully proved and enforced' his own sentiment that religion and science were not hostile but rather friendly to each other.<sup>103</sup> Spurred by fears that his own death might be imminent, he wrote to Dick from Africa in 1843 that

I am conscious no words can adequately express the gratitude I feel for the conviction which you as the instrument brought to my view. I was living without God and without hope in this world but the spirit of God by the reading of your book caused me to see the prospect awaiting my wild career. I found grace to devote myself to Him who died to save and resolve[d] thenceforward only to live to spread the blessings of the Gospel throughout the world.<sup>104</sup>

Sadly, Dick died two months prior to Livingstone's visit to Dundee on 25 September 1857. Addressing a cheering throng of Dundonians, Livingstone recalled that Dick's *Future State* 'was the means of enlightening my mind on the all-important subject, that subject which concerns us all--the reality of a future state, and the necessity of devoting ourselves to Him that gave up His life for us'. Remarkably, Dick acted as a magus of a sort to Livingstone, inspiring him to see himself as an instrument of Divine will. It would seem that Livingstone demonstrated his devotion to the memory of his recently deceased magus by ensuring that Dick's widow would continue to receive his state pension until her death. He reminded his ecstatic audience that 'I would not like to draw your sympathies away to the ends of the earth if you have not thought about her, and I hope that her declining years may be passed

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<sup>103</sup>D. Livingstone, *Travels and Researches in South Africa* (London, 1857, 1905), p. xviii.

<sup>104</sup>D. Livingstone to Dick, 7 July 1843, NLS MS 20314 ff 22-3.



in peace and comfort'.<sup>105</sup>

Dick's influence over other individuals was not quite so singular or so detectable in the course of history as his role in inspiring Livingstone. Nevertheless, one should also hear the voices of the lesser known. Three letters from 1847 might be taken as typical of Dick's influence. In March a William Kirkpatrick from Walsall wrote to Dick that 'you have been the chief cause of creating the desire I feel for a knowledge of the science [of astronomy]'. Kirkpatrick built a refracting telescope based upon instructions which Dick supplied in his tract on the solar system. In May Benjamin L. Green wrote that 'As one of the Young People who have to be thankful to you for your efforts to bring down the mysteries of Science to their capacity and to turn the reflections caused by a reception of Scientific truth to the glory of God - the Author of all - I beg to express my gratitude to you....' Green invited Dick to become the manager and director of a new magazine entitled *The Sabbath School Essayist*, which was intended to promote Sunday School institutes, but Dick must have declined the offer. In September a Mr. Charles Stubbings wrote that he was

greatly indebted to you for your valuable writings. Your "Christian Philosopher" expanded my views of the divine being, and contributed more to my profit than any other book which I have read save the Bible. It created a thirst for knowledge which it seems impossible to satisfy. I have purchased your works one after another till I possess nearly all and find I shall not be satisfied until I have them all in my possession. They have been the means of opening to me the beauty and glory of the creation, and the wisdom and goodness of the creator.<sup>106</sup>

Several themes emerge from these and other letters to Dick. First, Dick's readers complimented him on the pellucidity of his prose. As one Samuel Jennings wrote from Islington, 'I feel myself much indebted to you for

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<sup>105</sup>Rev. A.W. Ferguson, Dundee, 'Dr Thos. Dick and Livingstone', unpublished typescript, Dundee City Archives. The Heritage Centre at Blantyre has a copy of *Future State*.

<sup>106</sup>W. Kirkpatrick to Dick, 17 March 1847; B.L. Green to Dick, 7 May 1847; C. Stubbings to Dick, 25 Sep. 1847; NLS MS 9658 ff 103, 106, 107.

the simple manner in which you communicate your knowledge to others, for I cannot believe I should have had such a thirst for knowledge as I now possess if it had not been for that simplicity'.<sup>107</sup> Second, by avoiding the abstruse, Dick did stimulate within his readers a thirst for knowledge. He persuaded people like William Kirkpatrick that they too could build their own telescopes. As he himself put it, he hoped his works at least 'had a tendency to lead the minds of my fellow men into a useful train of thought, or to promote their moral improvement', and in this he was often successful.<sup>108</sup> Third, and most importantly, he persuaded many of his readers that their thirst for knowledge was God-given and that by quenching it they were glorifying God. Like Mr. Stubbings, Dick's readers perused his books for pleasure and came away convinced that a study of nature led to heightened awareness of God's involvement in their lives and of His power, wisdom and goodness as exhibited even in their grossly imperfect world.

Some of his readers also took away a deeper appreciation for the beauty and sublimity of God's creation. As suggested in chapter five, in his works Dick urged just such an aesthetic appreciation for nature. Some readers found this especially insightful, and in fact for one sensitive reader it incited his interest in astronomy. Daniel Simmons confessed to his mentor Dick that

There was a want of stability & concentration of mind which I could distinctly feel; & it was for the "Christian Philosopher" alone, to embody & invigorate the "Embryo faculties" & light them up into enduring flame. And when I heard that the stars uttered forth "music" as they rolled, my enthusiasm knew no bounds. Many a time (since that period) have I stood & gazed into the "blue empyrean," at the still, solemn, hour of midnight, watching the stars, & trying to catch the first strain of that "sublime harmony," which the immortal Kepler attempted to describe...

Simmons went so far as to write a letter, published in January 1849 in the *Liberty Press*, an abolitionist newspaper in Utica, New York, describing how

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<sup>107</sup>S. Jennings to Dick, 5 Nov. 1838, NLS MS 9658 f 30.

<sup>108</sup>Dick to E. Nott, 22 Dec. 1832, Schaffer Library, Union College.

reading the *Christian Philosopher* had changed his life.<sup>109</sup>

Such letters and themes are consistent with accounts of Dick's influence written by individuals after his death. In 1912 the famed astronomical instrument maker John A. Brashear made a pilgrimage to Dick's former home in Broughty Ferry. He praised Dick as 'the one man who, by his writings, has given the first inspiration to many of the great English-speaking astronomers of the last half-century', including E.E. Barnard among others.<sup>110</sup> Brashear further quoted the sentiments of Dr. Charles Alexander Richmond, President of Union College, who recalled that 'Dick's *Philosophy* [*Christian Philosopher?*] was a household book with us in my father's family as it was in many other Scottish homes in this country'.<sup>111</sup> And John Mills (1806-89), a wealthy Dundonian linen manufacturer and member of Dick's original secession kirk, answered Dick's call for an observatory to be built in every city by bequeathing to Dundee money for the construction of the astronomical observatory on Balgay Hill in Dundee which now bears his name. Today, Mills Observatory remains Britain's only full-time public observatory.<sup>112</sup>

A final letter reveals that one could encounter Dick's influence in unexpected places. George H. McHall, an acquaintance of Dick, wrote from

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<sup>109</sup>D. Simmons to Dick, 2 Jan. 1849, Glasgow University Observatory. I have been unable to locate Simmons's newspaper article.

<sup>110</sup>See W. Sheehan, 'E.E. Barnard and Mars: The Early Years', *Journal of the British Astronomical Association*, 103 (1993), 34-36. Other astronomers included Robert Stirling Newall, William Pringle of Edinburgh, and John Watson.

<sup>111</sup>J.A. Brashear, 'A Visit to the Home of Dr. Thomas Dick: The Christian Philosopher and Astronomer', *Journal of the Royal Astronomical Society of Canada*, 7 (1913), 19-30: 19-20, 26; idem, *A Man who Loved the Stars: The Autobiography of John A. Brashear* (Pittsburgh, 1924, 1988), pp. 3-4, 169-70.

<sup>112</sup>D. Gavine, 'The Mills Observatory, Dundee', *Journal of the British Astronomical Association*, 78 (1968), 278-81; H. Ford, 'The Mills Observatory, Dundee', *Journal of the British Astronomical Association*, 93 (1983), 251-53. Mills Observatory today receives about fifteen thousand visitors a year, according to Dr. Fiona Vincent, who was kind enough to show my wife and me around in late Mar. 1993.

Surat, India that while travelling aboard ship he had met a grandnephew of Lord Horatio Nelson, a lieutenant in the East India Company's navy and 'a very clever man & a great admirer of yours'. McHall also wrote that he had come across three of Dick's books in the possession of his fellow passengers, and that, since he had alighted in India, he had come across two or three more. 'I cannot tell you what pleasure it gives me', McHall concluded, 'to find you thus appreciated, at the uttermost ends of the Earth'.<sup>113</sup> Perhaps the conceit of McHall's description is allowable for one like Dick who, despite isolating himself on Fort Hill in Broughty Ferry, found himself on the receiving end of letters from India and Africa to the deep South and Western frontier of the United States.

#### 6.5 Thomas Dick and Popular Astronomy among the Working Classes

Another reader in the quarry was Robert Wallace, whose wife taught him to read after marriage, and who... [by 1816] had read eighteen different authors on astronomy... Robert Wallace had never seen the stars through a telescope, but he knew all that books could tell him of the celestial system. He would travel twenty miles on a Sunday, and back again, to borrow a book on astronomy.... The last time I was in that vicinity I saw this lost genius, aged and frail, raking the mud off the turnpike road, for a very small sum of wages, near Dunbar.

A. Somerville, *The Autobiography of a Working Man* (1848), pp. 17-8

The destitute Robert Wallace, head bent down raking mud for a pittance when he wanted so keenly to be gazing up at the heavens, demonstrates the main problem facing workers who wanted to pursue science: sheer lack of funds and of time. The average work week was sixty, seventy, or even eighty hours long (curtailed for factory workers, but not for labourers like Wallace, only in 1847 by the Ten Hours Act). Those who attended church on Sundays faced lengthy services on their one day off. If shortage of funds and time were not inhibiting enough, workers faced the problem of literacy. In the Lowlands of

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<sup>113</sup>G.H. McHall to Dick, Apr. 1852, NLS MS 9658 ff 132-3.

Scotland literacy was almost universal, but with one-third of the general population in England illiterate, and perhaps another third to one-half only semi-literate,<sup>114</sup> the majority of workers in England probably experienced considerable difficulty in reading even the simplest of texts on science. Workers also suffered from a lack of education in general, and, in Dick's view, inadequate education in science in particular. And many workers doubtless preferred, and perhaps a few erstwhile tyros of science succumbed to, the conviviality of pubs and the pleasures of drink, cock-fights, bull-baiting, and other less-than-rational pursuits.<sup>115</sup>

Recognizing the considerable difficulties and distractions that workers interested in science encountered, and remembering the pitiable example of Wallace, one should not however conclude from these that workers were forever being frustrated in their efforts to pursue science. In the eighteenth century, the Spitalfields weavers avidly studied practical mathematics, seeking both economic and social advance.<sup>116</sup> Anne Secord, building on David Allen's classic study of natural history, has shown conclusively that workers in the early nineteenth century made important contributions to botany.<sup>117</sup> And Samuel Smiles of course wrote not entirely unrealistic

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<sup>114</sup>Rates of literacy are notoriously difficult to measure. These percentages are suggested as rough guidelines by T.W. Heyck, *Transformation of Intellectual Life*, pp. 25-27. A more detailed study can be found in D. Vincent, *Literacy and Popular Culture: England 1750-1914* (Cambridge, 1989).

<sup>115</sup>On the many difficulties workers faced in pursuing knowledge see R.D. Altick, *English Common Reader*, pp. 85-98; D. Vincent, *Bread, Knowledge and Freedom*, pp. 120-25; *idem*, 'Reading in the Working-Class Home', in J.K. Walton and J. Walvin, eds., *Leisure in Britain 1780-1939* (Manchester, 1983), pp. 207-26, esp. 217-21; D.A. Hinton, 'Popular Science', pp. 28-58.

<sup>116</sup>L. Stewart and P. Weindling, 'Philosophical Threads: Natural Philosophy and Public Experiment among the Weavers of Spitalfields', *BJHS*, 28 (1995), 37-62, esp. 40-2.

<sup>117</sup>A. Secord, 'Corresponding Interests', *passim*; *idem*, 'Science in the Pub: Artisan Botanists in early Nineteenth-century Lancashire', *History of Science*, 32 (1994), 269-315; and D.E. Allen, *The Naturalist in Britain: A Social History* (London, 1976), esp. ch. 4. See also D. Vincent, *Bread*,

accounts of workers who, like the baker and geologist Robert Dick of Thurso, became skilled in science through 'self-help'. Hugh Miller represented perhaps the ultimate success story, that of a stonemason who through talent, diligence and manly pluck and perseverance became one of the most esteemed geologists and authors of his age.

Astronomy as a participatory activity presented unique problems for workers, however, with telescopes being especially dear. Indeed, for workers their prices must have seemed astronomical. Even so, resourceful workers were not priced out of astronomy. In his detailed study of popular science in England from 1830 to 1870, D.A. Hinton has concluded that 'Astronomy was evidently a participatory activity among working men which was surpassed only by geology and natural history'.<sup>118</sup> A few examples bear Hinton out.

Using a home-built reflecting telescope and his sawpit as an observatory, the sawyer Mr. Veitch became the first astronomer in Britain to spy the brilliant comet of 1811.<sup>119</sup> Roger Langdon (1825-94), whose weekly earnings as a railway station-master at Silverton in Devonshire never exceeded 30s. a week, constructed four telescopes and in 1871 read a paper before the Royal Astronomical Society.<sup>120</sup> Another railwayman, John Robertson of Coupar Angus, was inspired to pursue astronomy by Dick's lectures and books.<sup>121</sup> John Leech, a Frodsham shoemaker, appealed to George Airy, the Astronomer Royal, and in 1868 received from him astronomical books and

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*Knowledge and Freedom*, pp. 172-74.

<sup>118</sup>D.A. Hinton, 'Popular Science', p. 371. G.S. Kitteringham concludes that, next to natural history, astronomy was the most avidly pursued science in England from 1800-30. See his 'Science in England, 1800-30', p. 91.

<sup>119</sup>Dick, *Improvement of Society*, pp. 101-02.

<sup>120</sup>R. Langdon, *The Life of Roger Langdon, Told by Himself* (London, 1909), pp. 71-7.

<sup>121</sup>S. Smiles, *Men of Invention and Industry* (London, 1884), p. 329. My thanks to David Gavine for drawing Smiles's work to my attention.

instruments worth L12. Johnson Jex (c.1778-1852), 'the learned blacksmith of Letheringsett', pursued astronomy and a successful second career as a scientific instrument maker.<sup>122</sup> Later in the century, Frank H. Wright, before going to work for twelve hours, toiled between 5am and 7am for three months to grind a mirror for a Newtonian reflector he was building.<sup>123</sup> These examples of resourceful workers taking up astronomy could probably be multiplied considerably.<sup>124</sup>

Even so, it must be admitted that these workers were exceptional. Langdon and Jex were autodidacts, and self-education, then as now, requires a rare mix of ability, effort and self-discipline. Indeed, most workers probably learned astronomy outside the classroom. When offered by schools, education in astronomy could prove fragmentary if not downright misleading,<sup>125</sup> as can be seen in James Bonwick's fascinating account of his schooldays in the late 1820s:

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<sup>122</sup>I owe the examples of Leech and Jex to Allan Chapman's unpublished paper entitled 'Astronomers' Lives and Astronomers' Wives: Towards a Critical Biography of a Victorian Scientific Community', seminar series on 'Current Perspectives in the History of Astronomy', University of Oxford, 27 October 1994. On Jex see also 'Miscellanea', *The Athenaeum* (24 Jan. 1852), 123-24.

<sup>123</sup>A. Sutton, *A Victorian World of Science: A Collection of Unusual Items and Anecdotes Connected with Ideas about Science and its Applications in Victorian Times* (Bristol, 1986), pp. 101-02.

<sup>124</sup>At the age of fifteen, the apprentice William Andrews began to keep a diary of his astronomical observations. See H. Miles, 'William Andrews, a 19th century Amateur Astronomer', *Journal of the British Astronomical Association*, 98 (1988), 245-48. Thomas Morrison gained fame as the 'shoe-making philosopher' by lecturing on astronomy and natural philosophy. See I. Inkster, 'Advocates and Audience--Aspects of Popular Astronomy in England, 1750-1850', *Journal of the British Astronomical Association*, 92 (1982), 119-23: 122. A study of astronomy as understood and practiced by workers is a desideratum.

<sup>125</sup>However, in certain localities, and in mercantile institutes or in universities, education in astronomy could be quite thorough, as shown by D. Gavine, 'Navigation and Astronomy Teachers in Scotland Outside the Universities', *The Mariner's Mirror*, 76 (1990), 5-12. But for the working classes, their opportunities to learn astronomy appear to have been severely limited.

In my schooldays, instruction in Science was limited enough anywhere, even to us whose reading was absolutely confined to Bible Extracts. I learned nothing of Science but on the Twelfth-Night Magic Lantern Show. Then some rude astronomical slides were exhibited, along with lions, elephants and "funny bits" with the aid of bad oil. The description of the heavens was not brilliant, nor heard to advantage in the buzz of 500 boys.

After all, the primitive-looking orrery did illustrate the globe's daily and annual revolutions, though our Biblical impressions were not after Copernicus. We gathered from Genesis and the commentary of our teachers, that 4,000 B.C. the creation began, upon the sudden call of a mysterious Light; that the sun and earth were formed out of nothing; that man appeared in God's image, after the creation of plants and animals; but that no creative work was done on the seventh day or Sabbath.

We naturally thought more of the sun than of Jupiter or the Fixed Stars, and were quite convinced that the formation of the Heavenly Bodies was only in the interest of our earth, and service thereto. The first chapter of Genesis satisfied scientific inquiry. We pictured the heated state of Mercury and the cold of Saturn. It was not the age of criticism, but it did seem odd to us that Light should come before the Sun was made.<sup>126</sup>

When schools proved this unenlightening, what other avenues, besides self-education, were open to workers who sought knowledge of astronomy? By the 1820s, a number of independent promoters of astronomy offered short courses or single lectures on astronomy addressed specifically to workers.<sup>127</sup> By the 1830s, their efforts had largely been institutionalized in mechanics' institutes and other educational societies.<sup>128</sup> However, it remained largely the case that most lectures in astronomy, and perhaps particularly those illustrated with complex and expensive instruments like

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<sup>126</sup> J. Bonwick, *An Octogenarian's Reminiscences* (London, 1902), quoted in J. Burnett, ed., *Destiny Obscure: Autobiographies of Childhood, Education and Family from the 1820s to the 1920s* (London, 1982, 1994), p. 173. Born in 1817, Bonwick was educated at Borough Road School, Southwark, becoming a teacher there at age 15.

<sup>127</sup> Before this time, a course of lectures often cost two guineas, with single lectures at 2s. or 2s.6d, and advertisements to these lectures specifically addressed 'gentlemen' and 'ladies'. See J.A. Cable, 'The Early History of Scottish Popular Science', *Studies in Adult Education*, 4 (1972), 34-45.

<sup>128</sup> Detailed in I. Inkster, 'Advocates and Audience', 119-23.



orreries, were priced beyond the means of workers.<sup>129</sup> As is clear from Robert Wallace's example, basic texts on astronomy were plentiful,<sup>130</sup> though most workers would have found these too expensive to purchase. A few exceptional workers, like the ribbon weaver, spiritualist and free-thinker Joseph Gutteridge, shared their knowledge of astronomy with the local villagers. Gutteridge's lectures at the local village inn revealed to him that many of his neighbours

had no idea that the earth moved at all, but [they] thought the sun, stars, and moon went round it to produce the phenomena of day and night.... On being told that the earth moved ... [about the sun] with a speed of no less than 68,000 miles an hour their astonishment knew no bounds; such knowledge, imparted perhaps for the first time, seemed beyond their powers of comprehension.<sup>131</sup>

This was the audience which Dick especially targeted. In helping to educate workers in astronomy, Dick was a facilitator who had few peers. He lectured at cheap rates, wrote inexpensive texts, advocated the teaching of the sciences to all students and the construction of public observatories in every city and major town, and adapted his instruments to the constraints of workers' budgets. With respect to the latter, his aërial reflectors, because they did not require a long tube for their construction, were cheaper, if not easier to build, than reflectors of equivalent power and of more conventional design. Dick published instructions for their fabrication in *Mechanic's Magazine*, a three-pence weekly aimed at skilled artisans which sold nearly 16,000 copies per week in 1824.<sup>132</sup> He repeated these in his *Improvement of Society* (1833), along with instructions for building inexpensive

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<sup>129</sup>D. Gavine, 'Astronomy in Scotland 1745-1900' (Open Univ. Ph.D. thesis 1982), pp. 20-30.

<sup>130</sup>G.S. Kitteringham lists twelve titles available in the 1820s. See his 'Science in England, 1800-30', pp. 147-61.

<sup>131</sup>J. Gutteridge, *Lights and Shadows in the Life of an Artisan* (Coventry, 1893), pp. 105-06.

<sup>132</sup>*Ibid.*, pp. 212-14.

microscopes. A compound microscope, Dick encouragingly observed, might 'be easily constructed by any ingenious artizan or mechanic' for about eight shillings, four for the lenses and four for the tubes and miscellaneous parts.<sup>133</sup> And, while Dick served more prosperous enthusiasts with his *Practical Astronomer* (1845), a how-to manual priced at half a guinea, his tract on the *Telescope & Microscope* (1851), priced at six pence, provided the equivalent for those less well-off.

The three books and two tracts which Dick wrote specifically on astronomy were perhaps his most important legacy to workers. In writing for a lay public, Dick demonstrated an ability to simplify technical subjects without sacrificing accuracy. Readers found his works to be intelligible without in any sense being condescending. The religious imperative he gave to the study of the heavens proved attractive to many, as did his imaginative appeals to 'celestial scenery'. Through these books and tracts, Dick succeeded in encouraging workers to pursue astronomy in early Victorian Britain.

Judging from his correspondence, Dick was successful in reaching workers. Two letters are of particular interest. A Joseph Wass from Little Smeaton, near Pontefract in Yorkshire, wrote that

I have though a poor apprentice mecanic, bought and read with great interest, your Christian Philosopher, Philosophy of a future state, but especially your Diffusion of Knowledge. I have often thought that I should like to posses a microscope but as they are an extremely dear & expencive instrument there is no possibility of me for a long time buying one for myself. In your diffusion of Knowledge you have given some plain and apparently simple instructions for such a one as myself to make one. I am resolved to try to make one for myself by your directions.<sup>134</sup>

Wass's letter shows that 'poor' workers with a resolute interest in science

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<sup>133</sup>Dick, *Improvement of Society*, pp. 187-91.

<sup>134</sup>J. Wass to Dick, 24 Nov. 1851, NLS MS 9658 ff 128-29. Original spelling retained.

could afford to buy a few of Dick's books, and that these books served to stimulate them to make further exertions in science, in this case in microscopy. Another worker, John Butterworth, in his youth constructed his first microscope by following Dick's instructions. He later became a well-known geologist and prosperous mill owner.<sup>135</sup>

The second letter came from a worker slightly higher in the socio-economic scale. In querying Dick on telescope construction, John Watson, a Dundee shoemaker,<sup>136</sup> wrote that

I may mention that I am a Working Man... taking great pleasure in optical pursuits; and devoting a portion of the little spare time I have to its study, but notwithstanding the great assistance I derive from such books as I have access to, I sometimes encounter difficulties very hard to surmount.<sup>137</sup>

Wass's and Watson's letters reveal that lack of money, time, and expertise did not deter determined working-class devotees of science.

These two letters, and others like them, show that intelligent workers often pursued science, and astronomy in particular, because they were intrigued by it. In the words of J.F.C. Harrison, they showed a strong 'reverence for learning and the tools of learning' and a 'thirst for knowledge for its own sake'.<sup>138</sup> Thus a Mr. Robert Davy wrote to Dick that he was 'exceedingly attached to the study of the Heavens', so much so that he wanted to learn everything he could about the night sky. Celestial globes being beyond his means, he asked Dick for advice on 'the cheapest & most eligible'

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<sup>135</sup> [A Correspondent], 'A Lancashire Geologist', *Manchester Guardian*, 16 Jan. 1883, p. 6, c. 4. My thanks to Anne Secord for sending me a copy of this article.

<sup>136</sup> Shoemakers were among the lowest paid tradesmen, averaging 10s. to 15s. per week, placing them below most tailors, dyers, bakers, and smiths. See A. Wilson, *Chartist Movement in Scotland*, p. 6.

<sup>137</sup> J. Watson to Dick, 22 Jun. 1852, NLS MS 9658 ff 134-35.

<sup>138</sup> J.F.C. Harrison, *The Common People: A History from the Norman Conquest to the Present* (London, 1984), p. 293.

alternatives available to him. A Mr. James Robertson, asking to be excused for his poorly arranged letter since in his youth little in the way of education had been available to him, wrote to Dick that, by following his directions, he had built his own aërial reflector. In his letter, Robertson, who declared that all his mechanical jobs were self-taught, took obvious pride in his feat and the craftsmanship he had displayed in accomplishing it. Like another correspondent, a certain David Smith, Robertson professed himself to be a 'great lover' and 'admirer' of optics and astronomy.<sup>139</sup>

Why did these men pursue astronomy?<sup>140</sup> Not because it improved their skills at work, as their employers may have hoped. Nor was it a tool by which they hoped to control or disrupt the gears of industry. One might argue that astronomy, like any 'rational' pursuit which workers adopted, at least indirectly aided employers in their exploitation of workers, in that rational pursuits were considered effective in taming the irrational beast within. But this is not how workers themselves saw it. As David Vincent has shown in his study of working-class autobiographies, workers were not duped into pursuing rational or 'useful' knowledge. Rather, they defined and determined, based on their own needs, what was to them 'useful' knowledge.<sup>141</sup> Their desire for knowledge, and their intellectual gratification in obtaining it, both of which are too commonly attributed to intellectual élites only, do not require further explanations derived from class-based critiques or from ideologies which reduce all forms of knowledge either to grabs for power or to discourses

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<sup>139</sup>R. Davy to Dick, 4 Apr. 1842, NLS MS 9658 ff 68-9; J. Robertson to Dick, 2 July 1833, DCA GD/x246/3; D. Smith to Dick, 14 Feb. 1846, NLS Acc 6908 (pt). For similar references to workers pursuing science for intellectual gratification, see J. Gutteridge, *Lights and Shadows*, pp. 62, 85-92, 218.

<sup>140</sup>In chapter eight, section four, I discuss the pursuit of astronomy by women.

<sup>141</sup>D. Vincent, *Bread, Knowledge and Freedom*, ch. 7, 'The Idea of Useful Knowledge', pp. 133-65, esp. pp. 140-41. See also J. Burnett, *Useful Toil*, p. 131.

in politics.

One example may suffice here. With his fellow workers, the eighteen-year-old Charles Shaw formed an informal mutual improvement society. He recalled that

We could expatiate about the universe when an examination in the geography of England would have confounded us. We could discuss astronomy (imaginatively) when a sum in decimals would have plucked us from our soaring heights into an abyss of perplexity.<sup>142</sup>

Lack of education or money did not prevent Shaw and his friends from participating in the intellectual pleasures of astronomy. They may not have conversed while sipping port after a sumptuous dinner; yet, like their so-called 'betters', they were equally capable of perceiving, speculating upon, and enjoying the splendours of the heavens.

Shaw's efforts illustrate J.F.C. Harrison's point that 'self-help', in its original conception, was a working-class movement which frequently assumed collective form and which drew on a tradition of self-culture among the working classes themselves. Like their middle-class counterparts, self-conscious artisans sought to improve themselves to gain respectability. However, they defined 'respectability' not in middle-class terms but within 'an egalitarian working-class context'. Workers prized the sense of self-esteem and independence which they gained through their pursuit of knowledge, and often they were noticed and respected for their intellectual attainments by their fellow workers. It was not the case, then, that workers were somehow manipulated or directed into pursuing those activities which a hegemonic middle class wanted them to pursue.<sup>143</sup> Instead, they constructed their own cultural identities, largely independent of the exercise of putative cultural

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<sup>142</sup>C. Shaw, *When I Was a Child*, pp. 221-22.

<sup>143</sup>J.F.C. Harrison, *Common People*, pp. 271, 292-93, 303; *idem*, *Early Victorian Britain, 1832-51* (London, 1971, 1988), pp. 133-43.

hegemony by their social superiors.<sup>144</sup> Indeed, given the major obstacles which these workers had to surmount in their pursuit of science, it almost seems patronizing to suggest they were being directed or duped by an insidiously pervasive and hegemonic middle-class culture.

Just as the working classes themselves were 'an infinite series of sub-classes shading imperceptibly one into another' wherein there existed 'many variations in earnings, conditions of work and social status',<sup>145</sup> so too did their cultural pursuits show rich variations in interest and motivation.<sup>146</sup> In pursuing astronomy, workers exhibited a wealth of interests and motivations. As previously noted, astronomy had, and continues to have, intrinsic intellectual and imaginative appeal, and in many cases workers were simply fascinated by it. Especially in rural areas, workers enjoyed dark night skies, and, after working long hours during the day, they perhaps had a few minutes at night to explore the night sky with naked eye or, if they were lucky or resourceful, with a telescope. From this they may have gained a sense for exploring the vast unknown which was similar to the thrills which their intrepid and more well-to-do contemporaries enjoyed during their excursions into terra incognita.<sup>147</sup> Meanwhile, for workers like Charles Shaw and Charles Stubbings who had been inspired by Dick's writings, these

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<sup>144</sup>For the counterview that workers' behaviour and culture were modified significantly by their culturally more dominant social superiors, to the benefit of the latter, see M. Shiach, *Discourse on Popular Culture: Class, Gender and History in Cultural Analysis, 1730 to the Present* (Oxford, 1989), esp. pp. 72-77.

<sup>145</sup>On the heterogeneity of the working classes see J. Burnett, ed., *Useful Toil: Autobiographies of Working People from the 1820s to the 1920s* (London, 1974, 1994), pp. 3-38, 251-87 (on p. 252). Also see J.F.C. Harrison, *Early Victorian Britain*, ch. 2.

<sup>146</sup>Well demonstrated by R. Johnson, '"Really Useful Knowledge": Radical Education and Working-class Culture, 1790-1848', in J. Clarke, C. Critcher, and R. Johnson, eds., *Working-class Culture: Studies in History and Theory* (London, 1979), pp. 75-102.

<sup>147</sup>Many thanks to Anne Secord for this interesting suggestion.

nighttime explorations led to far keener expressions of reverence in the presence of celestial evidence of God's omnipotence and grandeur.

Yet in some cases astronomy fulfilled other needs for workers besides intellectual gratification or religious reverence. Interestingly, a few workers appear to have been motivated more by astrological than astronomical concerns (although interest in astrology was by no means restricted to workers).<sup>148</sup> Although astrologers were criminalized under the 1824 Vagrancy Act, this did not prevent workers like Richard Gooch, 'the Norfolk Astrologer', from lecturing and writing on astrology. Yet Gooch also studied astronomy and mathematics and constructed an orrery, portable diorama and camera obscura.<sup>149</sup> Given this overlap between astrology and astronomy in some people's lives, it is not surprising that more sober working-class astronomers like Roger Langdon complained that people often misunderstood his work, either holding him in awe or mistrusting him for skills of prognostication which they conferred upon him.<sup>150</sup> What is clear from this is that astrology, along with other 'superstitious' folk beliefs, persisted well into the nineteenth century, a fact which Dick found deplorable.<sup>151</sup>

Some workers, perhaps of an evangelical bent, may have seen astronomy as offering an escape from the sensuous and violent activities indulged in by

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<sup>148</sup>P. Curry, *A Confusion of Prophets: Victorian and Edwardian Astrology* (London, 1992).

<sup>149</sup>R. Gooch, *Memoirs, Remarkable Vicissitudes, Military Career and Wanderings in Ireland, Mechanical and Astronomical Exercises, Scientific Researches, Incidents and Opinions of Cassial, the Norfolk Astrologer, written by Himself* (Norwich, 1844), cited in J. Burnett, D. Vincent and D. Mayall, eds., *The Autobiography of the Working Class: An Annotated, Critical Bibliography. Volume I: 1790-1900* (Brighton, 1984), I, 61.

<sup>150</sup>R. Langdon, *Life of*, pp. 84, 87-9. See also J. Gutteridge, *Lights and Shadows*, pp. 104-06.

<sup>151</sup>Dick condemned astrology and particularly John Varley in *Improvement of Society*, pp. 19-24 and appendices three and four. On the persistence of folk beliefs see J.F.C. Harrison, *Common People*, pp. 172-83.

their co-workers. They might thereby have taken considerable pride (perhaps to the point of smugness) in their knowledge of astronomy, perhaps seeing it as a way to gain distinction among their peers as 'the astronomer-shoemaker so-and-so'. Meanwhile, skilled artisans like Joseph Wass seem to have relished the challenge of constructing their own telescopes to a self-defined level of craftsmanship. Obviously, astronomy possessed an almost kaleidoscopic range of meanings and uses among the working classes. Workers' readings of Dick's works were equally individual and rich. As the next section will show, the meanings and uses of Dick's works were equally varied and interesting in a Welsh context.

#### 6.6 Thomas Dick in Wales

My title here is somewhat deceptive, since to the best of my knowledge Dick never visited Wales. His books, however, did. It is quite extraordinary that three of these were translated into Welsh. This raises several interesting questions: Why did Dick's Welsh translators select his books? Who read these books, and how extensive was their distribution? Did his books assume different meanings in Wales? Fortunately, several letters survive by which some plausible answers to these questions may be suggested.

*The Christian Philosopher* (Yr anianydd Cristionogol) was the first of Dick's books to appear in Welsh. It was translated by Thomas Jones (1777-1847) and published by Robert Griffiths (1770-1844) at Caernarfon in 1842. The initiative came from Griffiths. A Calvinistic Methodist minister who was known for his concern for the welfare of the young,<sup>152</sup> Griffiths wrote to Dick in 1840 that

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<sup>152</sup> J. Evans, *Biographical Dictionary of Ministers and Preachers of the Welsh Calvinistic Methodist Body or Presbyterians of Wales* (Carnarvon, 1907), pp. 105-6.



Your works have met the approbation of men of learning, of judgment, of piety and of taste in the Principalities. Numbers of our countrymen and those in general who labour in our quarries and in our mines have no acquaintance with the English language, many of them are in good circumstances, eminent in piety and anxious for knowledge. I am persuaded your "Christian Philosopher" would be edifying to them.<sup>153</sup>

He appears to have judged his audience correctly, for he wrote to Dick in 1843 that 'I have printed 2250; they are gone except a few hundreds which I expect to sell in a short time....The "Philosopher" has had justice in the translation and I trust it will be a blessing to our nation'.<sup>154</sup>

Because Dick attempted to include in his *Christian Philosopher* the most current information on scientific and technical developments (but not information on contentious subjects like phrenology), he needed to update it periodically. By the 1850s, he had added a significant amount of new information to it, and a fresh effort was mounted in Wales to publish a revised translation. This was accomplished by Thomas Levi (1825-1916) and published in 1860 by Rees Lewis at Merthyr Tydfil. Editor of the leading Welsh journal *Trysorfa y Plant* from 1862 to 1911, author of some thirty works and translator of some sixty others from English into Welsh, Levi, like Griffiths, was a Calvinistic Methodist minister.<sup>155</sup> Rees Lewis, the publisher, was also apparently an 'early exhorter' of Methodists.<sup>156</sup>

With compendiums of useful knowledge quite numerous in the 1840s and 1850s, why did these Welshmen select Dick's *Christian Philosopher* for translation, and not once but twice? In the case of Griffiths, he selected this work after he had judged it effective both in preserving the piety of workers and in satisfying their inquisitiveness. It provided morally safe and

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<sup>153</sup>R. Griffiths to Dick, 12 June 1840, NLS MS 9658 ff 41-2.

<sup>154</sup>R. Griffiths to Dick, 24 Oct. 1843, NLS MS 9658 ff 86R, 88V.

<sup>155</sup>R.T. Jenkins, ed., *The Dictionary of Welsh Biography down to 1940* (London, 1959), p. 543 (hereafter cited as *DWB*).

<sup>156</sup>J. Evans, *Biographical Dictionary*, p. 197.

useful knowledge in a form which Griffiths must have found both attractive and broadly consistent with a Calvinistic Methodist agenda.

Yet why was this effort mounted specifically in the early 1840s? Though conclusive evidence is lacking, some suggestive linkages may be made. Griffiths first wrote to Dick from Caernarfon in northwest Wales in April 1840. Two years earlier, an industrial depression had hit Wales, followed in succession by three bad summers for farmers. Not coincidentally, the Chartist movement reached the height of its influence in Wales in 1839. That November, south Wales witnessed an alarming Chartist march on Newport during which troops opened fire on the marchers, killing twenty. Following on the heels of this protest came the last mass trial for treason in British history.<sup>157</sup> While north Wales was spared the worst of Chartist agitation, and Caernarfon, with its slate quarries producing roofing materials for export overseas, proved better able than most regions to weather the depression, fear of further Chartist marches and violence was widespread and keenly felt.<sup>158</sup> Griffiths, who ostensibly had the interests of all Welshmen in mind when he canvassed Dick, may have seen the *Christian Philosopher* as 'a blessing to our nation', in that it served to quieten workers' demands by persuading more thoughtful quarrymen and miners to pursue change through self-improvement and measured, peaceful reforms.

Such a moderate approach would have been consistent with a grass-roots cultural movement then emerging in Wales among workers. With local chapels serving as vibrant centres of education and communal religious spirit, this movement reflected workers' desires for self-fulfilment, to be attained in

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<sup>157</sup> D.J.V. Jones, *The Last Rising: The Newport Insurrection of 1839* (Oxford, 1985); I.G.H. Wilks, *South Wales and the Rising of 1839: Class Struggle as Armed Struggle* (London, 1984).

<sup>158</sup> D.G. Evans, *A History of Wales 1815-1906* (Cardiff, 1989), pp. 144-53, esp. 152; R. Wallace, *'Organise! Organise! Organise!': A Study of Reform Agitations in Wales, 1840-1886* (Cardiff, 1991).

part through cultivation of pursuits which they associated with 'cultured' society, to include the attainment of knowledge of the sciences. Highly localized, characterised by self-help, and, as Evans has noted, 'deeply embedded in the very soil of organized [largely Nonconformist] religion', this movement was abetted by entrepreneurs seeking to inhibit workers' propensities towards political extremism.<sup>159</sup> Whether workers drew the conclusions that these entrepreneurs wished them to draw, however, is debatable and, based on the evidence at hand, indeterminable.

The circumstances surrounding the second translation of Dick's *Christian Philosopher* supply further connections of potential interest. Rev. Thomas Levi, Dick's new translator, was an early and steadfast supporter of temperance<sup>160</sup> who for a time served as vice-president of the National Reform Union, a middle class, moderate, Manchester-based society which agitated for parliamentary reform. He later served from 1868 to 1871 as an agent for the Society for the Liberation of Religion from State Patronage and Control.<sup>161</sup> That he deemed Dick's *Christian Philosopher* worthy of being re-translated and published is yet another indication of the strength of Dick's appeal among like-minded, middle-class religionists bent on moderate reforms. As a Seceder, Dick also shared Levi's opposition to state-supported churches. Perhaps Levi was also prompted in part by the depression of 1857-

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<sup>159</sup> Evans, *History of Wales*, pp. 220-21; W.R. Lambert, 'Some Working-class Attitudes towards Organized Religion in Nineteenth-century Wales', in G. Parsons, ed., *Religion in Victorian Britain: Volume IV, Interpretations* (Manchester, 1988), pp. 96-114, esp. 99-103.

<sup>160</sup> At age twenty, he helped to establish the Gwent and Morgannwg Temperance Association in Merthyr, serving as its first secretary and itinerant lecturer. See W.R. Lambert, *Drink and Sobriety in Victorian Wales c.1820-c.1895* (Cardiff, 1984), pp. 123, 134-35, 263.

<sup>161</sup> D.G. Evans, *History of Wales*, pp. 281-84. See also I.G. Jones, *Explorations and Explanations: Essays in the Social History of Victorian Wales* (Llandysul, 1981), ch. 7, 'The Liberation Society and Welsh Politics, 1844 to 1868', pp. 236-68.

63, which severely disrupted the iron industry of Merthyr Tydfil. Providing morally uplifting and useful reading material like Dick's *Christian Philosopher* may have seemed an effective way to alleviate the boredom of unemployed workers while perhaps simultaneously enabling and persuading them to pursue economic recovery through self-help.

The common denominator in both cases is that provided by Calvinistic Methodism. Whereas all Protestant denominations in Wales were evangelical in their theology, espousing almost universally a moderate form of Calvinism, Calvinistic Welsh Methodists were more intensely evangelical and yet surprisingly undisturbed by doctrinal disputes. They strongly supported temperance and adamantly opposed Chartism, condemning trade unions at an association meeting in 1840.<sup>162</sup> With its pages replete with devotional phrases and references to God, and with its concise and uncontroversial summary of astronomy, geology, mechanics, and other subjects, Dick's *Christian Philosopher* proved to be ideally suited to the needs of Calvinistic Welsh Methodist ministers who sought both to edify and to educate workers.

Given the sound, safe, Christianized knowledge it contained, it is understandable that Dick's *Christian Philosopher* was adopted by Welsh Methodist ministers. However, it is somewhat surprising that his *Philosophy of a Future State* (*Anianyddiaeth sefyllfa ddyfodol*), his most speculative and prophetic work, was also adopted. This was translated by the Rev. Richard Parry (1803-97) and published by Richard Hughes (1794-1871)<sup>163</sup> in 1848. Raised in a Calvinistic Methodist family, Parry was an Independent minister

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<sup>162</sup>D.G. Evans, *History of Wales*, pp. 76-7, 89, 94, 218, 240; I.G. Jones, *Explorations and Explanations*, ch. 6, 'Religion and Society in the First Half of the Nineteenth Century', esp. pp. 229-33.

<sup>163</sup>DWB, p. 389. Hughes established a bookshop and press in Wrexham in 1823 and served as town postmaster in 1840. His son joined the firm in 1848. Hughes and Son went on to become a well-known publishing house in Wales.

and an accomplished poet.<sup>164</sup> A revealing letter written by Dick to Parry survives:

It appears to me an evidence of the intelligence of the Welsh, that such books should be desired... Such works could not yet be introduced into the Highlands of Scotland with any prospect of a remuneration for the expenses incurred. This perhaps is owing to the great body of the Welsh being Dissenters - people who think for themselves; for I have uniformly observed, in all places where I have been, that Dissenters are generally more intelligent than those who belong to an established church.<sup>165</sup>

The importance of the Dissenting tradition emerges here, with Dick unsurprisingly praising Dissenters for their intellectual prowess and integrity while expressing doubts about those who belonged to Established churches. In his praise Dick was undoubtedly sincere; he had nothing to gain, for example, when in 1854 he privately expressed his admiration for Quakers to the Presbyterian Rev. Dr. Sprague.<sup>166</sup> Unfortunately, nothing survives by which one might trace Parry's reasons for translating *Future State*. One might conclude straightforwardly that Parry found compelling the defence of the existence of a future state offered in this book, and that he valued it enough to want to disseminate it among his fellow Welsh. Yet it is perhaps significant that he published his translation of *Future State* in 1848, a year fraught with tension due to political revolutions on the Continent and a briefly resurgent Chartist movement in Britain.

The third and last of Dick's books which was translated into Welsh was his *Solar System* (*Y Dosparth heulawg*). Originally published by the Religious Tract Society (hereafter RTS) in two parts in 1846, it appeared in Welsh in 1850, translated by Eleazar Roberts of Liverpool, who probably acted under the auspices of the RTS. It had a significant impact on at least one Welshman's

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<sup>164</sup> *DWB*, p. 739.

<sup>165</sup> Dick to Parry, 27 Dec. 1848, Album Compiled by Richard Parry, National Library of Wales MS 10993C. At this time, Parry had a ministry in Llandovery.

<sup>166</sup> Dick to Sprague, 11 Oct. 1854, DCA GD/x33/2/6.

life: the slate loader, amateur astronomer and linguist John Jones (1818-98). Jones recalled that 'I first got an idea of astronomy from reading "The Solar System", by Dr. Dick... That book I found on Sundays in the preacher's library; and many a sublime thought it gave me. It was comparatively easy to understand'.<sup>167</sup> It is interesting that Jones found and read this work in his minister's library, and that he apparently liked it well enough to acquire his own copy.<sup>168</sup>

To summarize, Dick's works, which treated science as another aspect of Christian worship, conformed and contributed to the pervasiveness of religion and the Dissenting tradition in Welsh life. The translation of three of these suggests that Welsh Calvinistic Methodists and the RTS thought them ideally suited to shape and satisfy the reading tastes of typical Welsh working-class families. These tastes were well summarized by the Welsh linguist Robert Roberts in his autobiography:

In one or two short shelves... rests the humble stock of books which, scanty as it is, is larger than is usually found in Welsh farmhouses in the days of my youth... Conspicuous among them is a large folio Bible, with Peter Williams's Commentary. This is the family Bible, where the births, deaths, and marriages are entered. This is the great Hall Bible, always used at family prayers, and it was out of this that I learned my first letter.

The taste of the readers is easily seen from the fact of most of the books being theological. Among the older sort are *The Whole Duty of Man*, the *History of the Faith*, *The Pilgrim's Progress*, and the *Welshman's Candle*, or the *Vicar's Book*... This book, next to the Bible, was my earliest reading book. I read and re-read its homely rugged rhymes till I could repeat the greater part off by heart.... Among the newer are two commentaries, half a dozen volumes of polemical tracts, and the works of Gurnal... Of profane literature there is very little: the *Mirror of the Primitive Age* and *Afternoon of Wales* furnish all the history, and Robert's *Geography* ... a few poems... There were no English books, all were Welsh... There were no newspapers... but there were two monthly periodicals, *Y Drysorfa* (a Methodist magazine), and *Y*

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<sup>167</sup> S. Smiles, *Men of Invention and Industry*, p. 365.

<sup>168</sup> Jones's copy of Dick's *Y Dosparth Heulawg*, inscribed 'John Jones, Bangor, Awst 1853' survives today in the University College of North Wales, Welsh Library. My thanks to Anne Secord for this information.

Gwladgarwr, a secular paper something like the old Penny Magazine.<sup>169</sup> Many workers were quite simply 'eminent in piety' and 'anxious for knowledge', as Griffiths stated.<sup>170</sup> Recognizing this, and looking at Roberts's list, it seems likely that the influence of Dick's books in Wales outweighed their influence elsewhere because they conformed so well to the religious sentiments of Welsh Dissenters and because there were few other books on science available in Welsh.

While Dick conceived of himself as writing for all Christians everywhere, and even for unbelievers, he could hardly have foreseen the extent of his success in Wales, and, even more impressively, in the United States. Indeed, he had not consciously planned to address either Welsh or American audiences. The next two chapters chart Dick's remarkable success in winning large and admiring audiences in antebellum America.

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<sup>169</sup>R. Roberts, *A Wandering Scholar: The Life and Opinions of Robert Roberts*. Intro. by J. Burnett and H.G. Williams (Cardiff, 1991), pp. 17-8. R.D. Altick's account of the limited reading of Wesleyans agrees with Roberts's list; see *English Common Reader*, pp. 37-38. D. Vincent, in his *Bread, Knowledge and Freedom*, notes that a typical working-class family owned a Bible, perhaps a prayer or hymn book, maybe Bunyan's *Pilgrim's Progress* or Milton's *Paradise Lost*, and in rarer instances a few other, mostly religious, works (pp. 109-11). Born in 1834 at Havod Bach, Llanddewi, north Wales, the son of a struggling tenant farmer, Roberts was an ex-minister and linguist who emigrated to Australia. His autobiography was first published in 1923.

<sup>170</sup>One historian who emphasizes the seriousness of workers' religious faith is R. Moore, *Pit-men, Preachers and Politics: The Effects of Methodism in a Durham Mining Community* (Cambridge, 1974), 'Introduction'.

## Chapter 7

## A Scottish Christian Philosopher in Antebellum America

The "Christian Philosopher", The "Philosophy of Religion", and The "Philosophy of the Future State", are read, Sir, daily, by thousands and tens of thousands in these United States. They are in all our schools, and libraries, and private families. Select Readings have been collated from them, and Stereotyped as a Class-book for our Primary Schools. They are adopted as models of glowing composition, of elevated thought, and true sublimity. With the teachers, as with the pupils, the hope of the author is being realized; for, indeed, they do eminently tend to "invigorate the powers of religious contemplation and subserve the interests of rational piety". Accept then from me, Sir, in behalf of the Committee of Public Schools in Connecticut, the assurance of our common gratitude and unfeigned esteem.

Elijah Hinsdale Burritt writing to Dick in November 1833<sup>1</sup>

Although Thomas Dick never visited the United States, his works won large and admiring audiences there. This chapter seeks to identify and explore the sources of Dick's enormous popularity in antebellum America and the ways in which his ideas interacted with American society and culture. First, the publishing history of Dick's works in America is examined. Studies of the holdings of various classes of libraries confirm that Dick's works were ubiquitous in the 1830s, 1840s and 1850s. Second, reviews of Dick's works in various periodicals are canvassed. Most reviews were complimentary, even adulatory, but a few critics, such as the natural philosopher and science popularizer Denison Olmsted, did express reservations about Dick's works. Third, Dick is situated within a Northern evangelical cultural milieu, wherein he was admired and applauded particularly for his strong condemnation of slavery. And fourth, three relief efforts mounted on Dick's behalf are detailed, to include an analysis of 144 Americans, primarily from Philadelphia, who subscribed to a special edition of Dick's works.

But first, why were Dick's writings even more popular in America than they were in Britain? Primarily because they fitted perfectly both antebellum

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<sup>1</sup>E.H. Burritt to Dick, 4 Nov. 1833, NLS MS 9658 ff 23-4.



America's moralism and religiosity, associated with the outburst of revivals known as the Second Great Awakening,<sup>2</sup> and also Americans' desire for rational, useful, and elevating knowledge, manifested in the founding of lyceums and the building of schools and colleges.<sup>3</sup> Especially in the Northern states, Americans turned their backs on alcohol, gambling, personal gratification and other vices to work for the material and moral reform of their communities and the nation. Church attendance soared and Christian mores like charity and self-discipline were stressed. A more ideal audience for Dick's works could scarcely be imagined.

Similar cultural elements were of course present in Britain. Yet in America evangelicalism was stronger both socially and ecclesiastically. Whereas evangelicals in Britain faced severe challenges for cultural dominance, especially from High Churchmen and Liberals within the Anglican church, as well as from Benthamites (among others), evangelicals in America clearly occupied the cultural high ground. Their rivals were lightweights by comparison. The Catholic church in America, numerically the third largest Christian denomination by 1850, was culturally isolated and chiefly occupied in assimilating tens of thousands of Irish and German immigrants. Unitarians and transcendentalists were vocal but numerically small. Antebellum America was fundamentally an evangelical Protestant country.<sup>4</sup> Adding together

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<sup>2</sup>Its peaks came in the late 1820s and early 1830s, the late 1830s and early 1840s, and in the late 1850s. See R. Carwardine, *Transatlantic Revivalism: Popular Evangelicalism in Britain and America, 1790-1865* (Westport, Conn., 1978).

<sup>3</sup>R.B. Nye, *Society and Culture in America, 1830-1860* (New York, 1974); D.W. Howe, ed., *Victorian America* (Philadelphia, 1976), esp. Howe's introductory essay on 'Victorian Culture in America'.

<sup>4</sup>See the introduction, recommendations for further reading, and contemporary sources to 'Part Three: Evangelical Democracy' in C. Capper and D.A. Hollinger, eds., *The American Intellectual Tradition. A Sourcebook. Volume I: 1620-1865* (Oxford, 1989). Divisions and differences of opinion continued to exist among evangelicals, of course. Nye's *Society and Culture in America*, ch. 8, supplies a sketch of these.

Methodists, Baptists, Presbyterians, and Congregationalists, one obtains the remarkable figure of seventy percent of religious adherents in America who were sympathetic to the broad agenda of evangelicalism.<sup>5</sup> Evangelicalism extended its tentacles to touch all corners of American society, influencing the practices of religionists not normally known for their evangelical sympathies, such as Quakers and even Catholics.<sup>6</sup>

Acclaimed as a people's author of probity and deep piety, Dick himself was awarded considerable praise, including an honorary doctorate of laws which Union College in New York conferred upon him in 1833. Precisely why Union College singled out Dick for this academic honour is not known. It appears that Eliphalet Nott, president of Union College from 1804 to 1866, was the prime mover behind the decision to honour Dick.<sup>7</sup> A Presbyterian minister, abolitionist and campaigner for temperance, Nott believed strongly in the value of science as applied to practical ends (he was in fact a skilled inventor). Like Nott and Union College, Dick sought to inculcate Christian values in part through a solid education in the sciences. In honouring Dick, Nott and Union College were honouring both his and their own vision of Christian brotherhood--strongly underpinned by evangelicalism--and the strong belief they shared in science as a force for material progress and moral reform.

Dick's honorary doctorate was only the most obvious manifestation of the respect which Americans accorded to him. For a religiously serious and

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<sup>5</sup>Figures for 1850 were as follows: Methodists at 34.2%, Baptists at 20.5%, Catholics at 13.9%, Presbyterians at 11.6%, Congregationalists at 4.0%, and Episcopalians at 3.5%. See R. Finke and R. Stark, 'How the Upstart Sects Won America: 1776-1850', *Journal for the Scientific Study of Religion*, 28 (1988), 27-44: 31. Due to immigration, by 1865 Catholics had overtaken Methodists as the largest Christian denomination in America.

<sup>6</sup>M.A. Noll, *A History of Christianity in the United States and Canada* (London, 1992), p. 241 and *passim*.

<sup>7</sup>DAB, XIII, 580-81.

increasingly literate American public, his message that science, pursued correctly, represented a non-sectarian and pious quest for knowledge of God and was, in essence, a form of Christian worship which was consistent with, and even confirmed and advanced, evangelical tenets, was intrinsically and powerfully appealing. His 'doxological' or God-praising theology of nature upheld what many Christians believed in their hearts to be true. Indeed, an overwhelming majority of evangelicals in America saw science and Christianity as complementary pursuits.<sup>8</sup> Dick's avoidance of abstruse metaphysical questions and doctrines, and his emphasis on Christian piety and morality and social reform based on love to God and one's fellow humans, resonated powerfully with the majority of Americans who found complex metaphysics unappealing, unenlightening, and unnecessary.

Americans' predilection for direct and accessible moral systems was shown in the immense influence which Scottish common-sense philosophy had in antebellum America, both within theological circles and among the wider populace.<sup>9</sup> As one contemporary put it, 'direct and immediate experience and observation in human affairs', of which all humans were capable, served to convince all unbiased humans of the reality and reliability of causation. From this it followed that the postulate that order and purpose in nature

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<sup>8</sup>See G.M. Marsden, 'Evangelicals and the Scientific Culture: An Overview', in M.J. Lacey, ed., *Religion and Twentieth-century American Intellectual Life* (Cambridge, 1989), pp. 23-48; idem, 'The Collapse of American Evangelical Academia', in A. Plantinga and N. Wolterstorff, eds., *Faith and Rationality: Reason and Belief in God* (Notre Dame, 1983), pp. 219-64, esp. 230-33; J. Turner, *Without God, Without Creed: The Origins of Unbelief in America* (Baltimore, 1985), ch. 3; and T.D. Bozeman, *Protestants in an Age of Science: The Baconian Ideal and Antebellum American Religious Thought* (Chapel Hill, 1977).

<sup>9</sup>C. Cherry, 'Nature and the Republic: The New Haven Theology', *New England Quarterly*, 51 (1978), 509-26; L.L. Stevenson, *Scholarly Means to Evangelical Ends: The New Haven Scholars and the Transformation of Higher Learning in America, 1830-1890* (Baltimore, 1986); D.W. Howe, *The Unitarian Conscience. Harvard Moral Philosophy, 1805-1861* (Middletown, Conn., 1970, 1988), pp. 27-40; A. Hook, *Scotland and America: A Study of Cultural Relations 1750-1835* (Glasgow, 1975), pp. 73-115.

implied a Designer was 'an ultimate fact in our natures' which no human could deny without denying human rationality itself.<sup>10</sup> Scottish common-sense philosophy, in its emphasis on the capacity of humans to acquire certain knowledge of nature through ratiocination, reflected antebellum America's confidence in humanity's ability to uncover 'truth' and provided a basis for irenic consensus in religion. And in Dick's works Americans discovered that their irenic, and even ecumenical, aspirations were matched by Dick's own attempts to avoid or avert doctrinal disputes.

Theologically becalming, and in Burritt's words 'elevated' and of 'true sublimity', Dick's works also served as a solid and safe introduction to the sciences. As one obituary put it, 'Although he is the author of no brilliant discovery, yet in the great and needed art of laying the fruits of scientific research before the world in clear and attractive language, no man has surpassed, if equaled him'.<sup>11</sup> Making Dick's works irresistible to many Americans was the skilful way in which they combined basic knowledge of the sciences with sound moral and Christian values to preach the optimistic message that progress towards the millennium was to be had through acquiring and disseminating knowledge.<sup>12</sup> At the same time, as shown in chapter five, by stressing nature's aesthetic dimensions, nature's moralizing power and spiritually uplifting qualities, and signs of the Deity's intimate involvement

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<sup>10</sup> See Anon., 'The Argument for Natural Religion', *Christian Examiner*, 19 (1835-6), 137-63: 147. See also M. Gauvreau, 'The Empire of Evangelicalism: Varieties of Common Sense in Scotland, Canada, and the United States', in M.A. Noll et al., eds., *Evangelicalism: Comparative Studies of Popular Protestantism in North America, the British Isles, and Beyond, 1700-1990* (Oxford, 1994), pp. 219-52, esp. 234-40.

<sup>11</sup> *Saco Maine Democrat*, 29 (25 Aug. 1857), no. 4, p. 2, c. 7 [reprinted from the *Boston Journal*, n.d.].

<sup>12</sup> Dick's role in spurring the diffusion of knowledge in America to reform society in preparation for Christ's return was discussed briefly by M.E. Curti, in *The Growth of American Thought* (New York, 1943), p. 358, and by A.A. Ekirch, Jr., in *The Idea of Progress in America 1815-1860* (New York, 1944), pp. 200-1.

in nature, Dick also attracted admirers outside traditional Christian circles, most famously Ralph Waldo Emerson.<sup>13</sup>

### 7.1 The Cultural Penetration of Dick's Works in Antebellum America

This section provides a survey of the remarkable diffusion of Dick's works in antebellum America. Although publishing statistics are scarce, from 1826, when his *Christian Philosopher* first appeared, until the 1860s and 1870s, far in excess of one hundred thousand copies of Dick's books must have sold in America. As James Read, a bookseller in Cornhill, England, wrote to Dick in 1851, 'I should think from the tone of the American mind - that your Books - in some of their states, at least, must have had a large circulation there'.<sup>14</sup> Read was right: Americans bought Dick's books in large numbers for better than fifty years.

The sheer number of publishers who worked to meet the demand for Dick's works--at least twenty separate houses--was in itself astonishing.<sup>15</sup> They were an eclectic lot. Robert Carter in New York, a Scottish immigrant, was a devout and disciplined Presbyterian who published mainly religious works; Edward C. Biddle in Philadelphia was an equally devoted Quaker. In contrast, Harper & Brothers in New York, a notorious pirate of British books, and

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<sup>13</sup> Emerson visited Dick in Scotland probably in Feb. 1848, but his multi-volume collected letters contain no reference to his visit.

<sup>14</sup> J. Read to Dick, 4 Jan. 1851, NLS MS 9658 ff 123 R.

<sup>15</sup> In New York: Robert Carter & Brothers; G.&C.&H. Carvill; Harper & Bros.; Lane & Scott; Saxton & Miles; Solomon King; Robinson, Pratt & Co.; S.A. Rollo; R. Schoyer; Henry & Elihu Phinney in Cooperstown. In Philadelphia: Edward C. & James Biddle; Claxton, Remsen & Haffelfinger; L. Johnson; Leary & Getz. In Hartford: Sumner and Goodman; Robinson and Pratt. Others include Saxton & Kelt in Boston; Merriam in Brookfield, Mass.; H.S.&J. Applegate & Co., Cincinnati; S. Wilson and T.C. Slack in Milton, Penn.; Edwards & Bushnell, St. Louis. Compiled from *National Union Catalog pre-1956 Imprints*, v. 142 (London, 1971), 551-60, and from Research Libraries Information Network (RLIN) computer search.

Applegate in Cincinnati, were motivated less by piety and more by pecuniary rewards.<sup>16</sup> That they all took an interest in Dick's works demonstrates the breadth of Dick's appeal.

Moreover, whereas no British publisher ever issued a collected series of Dick's works, in America several publishers, including Applegate, Biddle, Edwards and Bushnell in St. Louis, and Summer and Goodman in Hartford, all published complete editions of his works. These were reprinted at steady intervals. Applegate's edition of Dick's works, eleven volumes in two, first issued in 1850, was reprinted each subsequent year until 1857, then reissued in 1859, 1861, 1863, 1868, and lastly in 1873.<sup>17</sup> The initial print run was for a whopping ten thousand copies. Incredibly, by 1859 Applegate had printed eighty thousand copies, in royal octavo format, priced at \$4.50 per set.<sup>18</sup> Perhaps even more incredibly, a nine-volume set of Dick's works was published in New York as late as 1884. The latter instance was probably attributable to the fact that, until the close of the nineteenth century, Dick's life and writings appear to have been a subject 'for prize essays in the schools of New York and adjacent towns'.<sup>19</sup>

Yet, despite the plaudits he won in Northern and Western states, Dick's works were not pirated or distributed by Southern publishers. New England,

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<sup>16</sup>See J. Tebbel, *A History of Book Publishing in the United States. Volume I. The Creation of an Industry 1630-1865* (New York, 1972), 328-33 and *passim*.

<sup>17</sup>*National Union Catalog*, v. 142, 552-3.

<sup>18</sup>W. Sutton, *The Western Book Trade: Cincinnati as a Nineteenth-century Publishing and Book-trade Center* (Columbus, Ohio, 1961), pp. 111-15, esp. 112. Applegate was known for publishing non-copyrighted, standard works for which they could expect steady sales and handsome profits. Dick's Works must have exceeded their expectations.

<sup>19</sup>E.G. Hutcheson, 'Thomas Dick, LL.D., F.R.A.S., Astronomer and Reformer', *The People's Friend* (Dundee), 29 July 1901, 532. Lending credence to Hutcheson's claim is that as late as 1888 the *Christian Philosopher* was still being published in New York, and in 1890 *Mental Illumination* reappeared, retitled as *Popular Education* [*National Union Catalog*, v. 142, 558].

New York, Pennsylvania, Ohio and Missouri were his areas of influence. His criticism of slavery, discussed in section three below, doubtless made him unwelcome south of the Mason-Dixon line. In the North and West, however, such strong and controversial moral stances probably served to enhance his reputation as a Christian philosopher.

Further evidence of the respect Americans accorded to Dick can be had from the comparative generosity exhibited by three of his American publishers. In the absence of an international copyright agreement, Dick's American publishers were under no legal obligation to pay him anything. Yet, while most American publishers pirated his works, three paid him modest sums. Harper & Bros. were surprisingly generous, paying him L80 for *Sidereal Heavens* and L50 for *Practical Astronomer*. A notorious pirate, Harper's willingness to compensate Dick probably stemmed from the strong demand for his works in America. Biddle paid Dick L20 for his tract on the atmosphere and a further \$60, or about L11, for his *Christian Beneficence*, 'although he was under no obligation to do so', Dick admitted.<sup>20</sup> Applegate sent L21 to Dick on 20 May 1850 'as a small token of our reverence and esteem', declaring that 'your writings are not only favourably but influentially known throughout the bounds of our wide spread and happy Republic, and that our citizens are better in a mental as well as moral aspects because of the labours of Doct. Thomas Dick'.<sup>21</sup>

Applegate's claim that Dick's works were well and influentially known in America was if anything an understatement. One might concentrate on their appropriation by evangelicals, and Methodists in particular, for they were the

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<sup>20</sup> Amounts given in a letter that Dick sent to J.A. Elkinton, 9 Jan. 1850, published in 'Dr. Thomas Dick', *The Dollar Newspaper* (Philadelphia, 20 Feb. 1850), c. 7. See section four below for Biddle's role in mounting a relief effort for Dick.

<sup>21</sup> Applegate to Dick, 20 May 1850, DCA GDx246.

largest and most influential Christian denomination in America in 1850. Methodists adopted three of Dick's books--*Christian Philosopher*, *Philosophy of Religion*, *Improvement of Society*--and two of his tracts--*Atmosphere and Telescope and Microscope*. Rev. H.D. Gossling abridged the three books, which were published from 1838-39 for the Methodist Episcopal Church, while Daniel P. Kidder revised the tracts.<sup>22</sup> These were published in the early 1850s for the Sunday-School Union of the Methodist Episcopal Church.<sup>23</sup> From examining Gossling's abridgement of the *Christian Philosopher*, it appears that he deleted the few controversial statements Dick included therein, for example, the idea that geology pointed to a much older earth than Genesis would seem to allow. However, he let stand Dick's comments in support of the plurality of worlds and Dick's vision of a future state, which suggests that Methodists found these assertions to be less theologically contentious.

Also finding merit in Dick's writings was the American Sunday-School Union (hereafter ASSU). Founded in 1824, the ASSU had an arrangement with the Religious Tract Society (hereafter RTS) to publish concurrently those works of the RTS which were 'best suited to our circulation' as judged by their 'general utility' and 'sound moral tendency'.<sup>24</sup> Dick's *Telescope and Microscope* was one such work which the ASSU apparently judged consistent with their goal of providing 'a clean and helpful [juvenile] literature for those

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<sup>22</sup>Kidder (1815-91) was a Methodist clergyman and secretary of the Methodist Sunday-School Union from 1844 to 1856. See DAB, X, 369-70.

<sup>23</sup>For a listing of these see K.E. Rowe, ed., *Methodist Union Catalog: Pre-1976 Imprints* (Metuchen, New Jersey, 1978), III, 407-08. Rowe does not list Dick's *Solar System*, but the National Union Catalog lists part 2 of this work as being revised by Kidder. Why the Methodist Sunday-School Union would publish only the second part of *Solar System* is a mystery, unless they relied on the RTS to supply copies of part 1.

<sup>24</sup>Dick, *Telescope & Microscope* (Philadelphia: ASSU, n.d. [c.1851]), frontispiece.



communities remote from towns and from any public library'.<sup>25</sup> Another evangelical organisation, the American Tract Society, sold Dick's *Christian Philosopher* through its booksellers and adopted his *Mental Illumination* as volume four of its forty-five-volume 'Christian Library'. Like the RTS and ASSU, the American Tract Society sought converts to evangelical Christianity.<sup>26</sup> It was presumably with this goal in mind that the Society sponsored Dick's writings.

In this evangelical milieu, and perhaps especially within Sunday schools, Dick's works had, in theory, potentially far more influence than in society at large because of a comparative dearth of alternative sources on science. A study of library catalogues at four separate Sabbath schools supports this theory. Books most commonly found in these libraries were moral tracts with titles like 'Willie Seeking to be a Christian'. Those few books on nature or science which appeared on the shelves were usually non-controversial expositions on nature's wonders, prosaic guides to mountain flowers and suchlike, or moral lessons drawn from nature. However, in rare instances these libraries stocked more rigorous works of science, as detailed in table 7.1.<sup>27</sup>

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<sup>25</sup>E.W. Rice, *The Sunday-school Movement (1780-1917) and the American Sunday-school Union (1817-1917)* (Philadelphia, 1917; repr. 1971), pp. 145-46.

<sup>26</sup>S.E. Slocum, Jr., 'The American Tract Society: 1825-1975. An Evangelical Effort to Influence the Religious and Moral Life of the United States' (New York Univ. Ph.D. thesis 1975), pp. 70-77.

<sup>27</sup>*Catalogue of Books in the Sabbath School Library of the Park Street Methodist Episcopal Church, Worcester* (Boston, 1857); *Catalogue of the Calvinist Sabbath School Library, Worcester* (Worcester, 1854); *Catalogue of the Calvinistic Congregational Sabbath School Library in Fitchburg* (Fitchburg, 1857); *Catalogue of the Evangelical Sunday School Library of Westboro* (Westboro, 1888).

Table 7.1 Works on Science in Four Sabbath School Libraries in Massachusetts

Name	Location	Titles
Methodist Episcopal Church	Worcester	Dick's Telescope & Microscope Dick's Atmosphere <sup>28</sup>
Calvinist Sabbath School	Worcester	Paley's Natural Theology, Dick's Solar System (pt. 2), Dick's Telescope & Microscope, [?] Astronomy
Calvinistic Congregational	Fitchburg	Miller's Testimony of the Rocks Dick's Solar System
Evangelical Sunday School	Westboro	E.F. Burr's Parish Astronomy

As these libraries were all located within a fairly small region of central Massachusetts, their holdings may not be typical of Sabbath schools in other regions. Nevertheless, it is readily apparent that, as in Britain, Dick's tracts helped him to win a wider audience, in this case children and teenagers in evangelical schools. Moreover, it is significant that evangelicals adjudged Dick's works to be consistent with their efforts to educate youth and also perhaps to win converts.<sup>29</sup>

To measure the availability of Dick's works in other contexts, seventeen library catalogues of mechanics' associations or institutes and mercantile libraries were also surveyed.<sup>30</sup> Table 7.2 summarizes the holdings of these libraries.<sup>31</sup>

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<sup>28</sup>Not listed in the catalogue, but the American Antiquarian Society owns a copy with the bookplate of this library. Perhaps it was given as a school prize, as this copy is signed by one Katherine Baldwin.

<sup>29</sup>I discuss evangelical children's literature and education at greater length in chapter eight, section three.

<sup>30</sup>For a short description of these libraries, see Nye, *Society and Culture in America*, pp. 362-64.

<sup>31</sup>*Catalogue of the Books of the Library of the Maine Charitable Mechanic Association, founded July, 1820 (Portland, 1900), pp. 42-3; Catalogue of the Salem Mechanic Library (Salem, Mass., 1851); Catalogue of Books of the Mechanic Apprentices' Library Association (Boston, 1847); Catalogue of the Mechanics' Institute Library of San Francisco (San Francisco, 1867); A*

Table 7.2 Dick's Works in Mechanics' and Mercantile Libraries

Name of Library	Location	Date	Holdings
Maine Charitable Mechanic Assoc.	Portland	1900	IS, CS, Works
Salem Mechanic Library	Salem	1851	CP, PR, FS, IS, MI, CB CS (2), SH
Mechanics Apprentices' Library	Boston	1847	CP, IS, MI, CS, SH
Mechanics' Institute Library	S.F.	1867	IS, CS, SH
Middlesex Mechanic Assoc.	Lowell	1846	IS, CS (2), SH (3)
Worcester County Mechanics Assoc.	Worces.	1857	PR, IS (2), CS, SH
Providence Assoc. of Mechanics	Provid.	1866	CP, IS, CS, SH, PA
Newport Assoc. of Mechanics	Newport	1850	CP, FS, IS*, MI, CB CS*, SH*
Printers' Free Library	New York	1855	CP, IS
Westboro' Mechanic Assoc.	Westboro	1848	PR, IS*, CS*, Works
St. Louis Mercantile Library	St. Louis	1858	CP (2), IS*, IS, CB CS*, SH*
New York City Mercantile	New York	1866	CP, PR, FS (2), IS*, MI (2), CB, CS*, SH*, PA
Brooklyn Mercantile Library	Brooklyn	1880	IS, CS, SH, PA, Works
Mercantile Library Co.	Philadel.	1850	IS (3), CB, CS (2), SH PA, Works
Young Men's Mercantile Library	Cincinnati	1855	CP, IS*, MI, CS*, SH* PA, Works
Mercantile Library of Boston	Boston	1854	CP, IS*, CS*, SH*, Works
San Francisco Mercantile	S.F.	1854	Works

Key to abbreviations: CP: Christian Philosopher; PR: Philosophy of Religion; FS: Future State; IS: Improvement of Society; MI: Mental Illumination; CB: Christian Beneficence; CS: Celestial Scenery; SH: Sidereal Heavens; PA: Practical Astronomer; Works: usually eight or ten of Dick's books combined in two volumes.

An asterisk (\*) signifies a book identified as part of Harper's Family Library (as discussed below).

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Catalogue of the Library of the Middlesex Mechanic Association, at Lowell, Mass. (Lowell, 1840, 1846); Catalogue of the Library of the Worcester County Mechanics Association (Worcester, 1857); Catalogue of the Mechanics and Apprentices' Library, established by the Providence Association of Mechanics and Manufacturers (Providence, 1866); Catalogue of the Library, of the Newport Association of Mechanics and Manufacturers (Newport, 1850); Catalogue of the Printers' Free Library, under the Direction of the New York Typographical Society (New York, 1855); Catalogue of the Westboro' Mechanic Association's Library (Westboro, Mass., 1848); E.W. Johnson, Catalogue Systematic and Analytical of the Books of the Saint Louis Mercantile Library Association (St. Louis, 1858), pp. 196, 301-2, 306, 315; Catalogue of Books in the Mercantile Library, of the City of New York (New York, 1866); Catalogue of the Brooklyn Mercantile Library. 3 vols. (Brooklyn, 1877-80); A Catalogue of the Mercantile Library Company of Philadelphia (Philadelphia, 1850), pp. 69, 71, 169, 287, 299; Catalogue of the Young Men's Mercantile Library Association, of Cincinnati (Cincinnati, 1855); Catalogue of the Mercantile Library of Boston (Boston, 1854); Catalogue of the San Francisco Mercantile Library (San Francisco, 1854).

Dick's books were well represented in virtually all of these libraries. Particularly popular was his *Christian Philosopher* and the three books that Harper & Bros. adopted for their 'Family Library': *Improvement of Society*, *Celestial Scenery*, and *Sidereal Heavens*. Harper's 'Family Library', and later its 'School District Library' as well, were inexpensive and popular series of books. Books in the former sold for forty-five cents, in the latter for thirty-eight cents. The Family Library turned up everywhere; for example, the frigate *United States* carried a complete set, which Herman Melville raided as he sailed home from the South Pacific.<sup>32</sup> Harper's began issuing books in the Family Library in 1830, eventually publishing 187 titles. Promoted as 'interesting, instructive, and moral books', Harper's claimed that together they represented the cheapest series of books ever published.<sup>33</sup>

Yet Harper & Bros. soon undercut this claim with their School District Library. This was begun in 1838-39 in response to a call for such a series from libraries in New England and New York. Much money was to be made in supplying schools with books. For example, the New York State Legislature in 1841 appropriated annually \$55,000 for five years to each school district which could raise matching funds.<sup>34</sup> Dick had four books in Harper's School District Library series: the three aforementioned titles in the Family Library, and *Practical Astronomer*.<sup>35</sup> As table 7.2 suggests, by being in these libraries Dick's books enjoyed an even wider distribution.

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<sup>32</sup>T. Hillway, 'Melville's Education in Science', *Texas Studies in Literature and Language*, 16 (1974), 411-25: 413.

<sup>33</sup>E. Exman, *The Brothers Harper: A Unique Publishing Partnership and its Impact on the Cultural Life of America from 1817 to 1853* (New York, 1965), pp. 21, 108-09, 130, 266-67. For complete listings of titles in the Family and School District Libraries see pp. 381-87.

<sup>34</sup>J.H. Harper, *The House of Harper* (New York, 1912), p. 64.

<sup>35</sup>In the Family Library, IS was v.59, CS was v.83, SH was v.99. In the School District Library, IS was v.38, CS was v.24, SH was v.135, and PA was v.250.

Harper's Family and School District Libraries sought to serve the leading fashions of the day: the interrelated desires for moral improvement and useful knowledge. As Robert Gross discovered in his study of the Concord Social Library, library committees in antebellum America preferred to buy useful, serious and elevating books, eschewing religious and political polemics. Society's moral reform, it was widely believed, might be helped along through reading the right books, books which would strengthen both mind and moral fibre. With this belief in mind, the Concord Social Library in the 1840s, Gross notes, was 'quick to buy up both practical works of science... and general studies of astronomy; these constituted fully an eighth of the decade's acquisitions'. Not surprisingly, two of the library's purchases were Dick's *Improvement of Society and Sidereal Heavens*.<sup>36</sup>

This section has offered a preliminary survey of the publishing history of Dick's works in America. It conclusively demonstrates their astonishing, and, in some regions, their long-lasting popularity. In the newly created mass market for reading in antebellum America, Dick's works were ubiquitous, helping to democratize culture and to enlarge and further Christianize the public sphere. Used in schools to supply examples of 'correct' composition and proper Christian character, pirated by publishers, acquired by libraries, adopted by the Methodist church and other evangelical organizations, Dick's works perfectly matched, and helped to sustain, Americans' desire for useful knowledge informed by Christian concerns, knowledge which many felt to be crucial for the moral regeneration of their communities and of American society.

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<sup>36</sup>R.A. Gross, 'Much Instruction from Little Reading: Books and Libraries in Thoreau's Concord', and 'Reconstructing Early American Libraries: Concord, Massachusetts, 1795-1850', *Proceedings of the American Antiquarian Society*, 97 (1987), 129-88 and 331-451, esp. 339 and 412.

## 7.2 Reviews of Dick's Works in American Periodicals

Dick's works were widely reviewed in American periodicals. Most interesting were those reviews which came prior to 1832 or so, before Dick became the 'venerable' and 'estimable' Dr. Dick whose eminence went largely unchallenged. Denison Olmsted (1791-1859),<sup>37</sup> who had only recently assumed the chair of mathematics and natural philosophy at Yale in 1825, penned the most comprehensive review of the first American edition of Dick's *Christian Philosopher* (1826) for the evangelical *Christian Spectator*. This book, Olmsted wrote, was 'well adapted to promote a union of that admiration of nature with piety towards its Author' which had been the hallmark of Timothy Dwight's sermons at Yale. Dick's work was not highly original, Olmsted added, but it did excel most kindred works 'in its tendency to promote at once the cultivation of the understanding and the affections'. Olmsted concluded by cordially recommending the book as being 'replete with valuable information respecting the creation, and radiant with devout and pious sentiments towards the Creator'.<sup>38</sup>

Yet Olmsted also expressed serious, mainly theological, reservations about the *Christian Philosopher*. He criticized Dick for his 'feeble attempt' to derive from nature evidence for the doctrines of the resurrection of the dead and of the general conflagration. With respect to the former, he found Dick's comparisons between the physical transfigurations of the redeemed and the transformations which insects such as butterflies underwent in their life-cycles degrading. Not only did they (unintentionally) nearly profane a

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<sup>37</sup> See G.L. Schoepflin, 'Denison Olmsted (1791-1859), Scientist, Teacher, Christian: A Biographical Study of the Connection of Science with Religion in Antebellum America' (Oregon State Univ. Ph.D. thesis 1977); and DAB, XIV, 23-4.

<sup>38</sup> D. Olmsted, 'The Christian Philosopher', *Christian Spectator*, 9 (1827), 149-61: 151, 161.

subject which was meant to remain a mystery, Olmsted observed, but they might also drive a person who had been convinced of God's existence by natural evidence of God's being and attributes back into the arms of sceptics.

Olmsted's chief reservation concerned the way in which Dick pointed to evidence of humanity's Fall in nature. Whereas Dick suggested that earthquakes, tornadoes, and other natural calamities would not have existed if the Fall had not occurred, and that they were still used by God to punish humans for their continued disobedience and sinfulness, Olmsted countered that God's tender mercies were over all His works, and that His laws of nature were entirely benevolent. For Olmsted, tornadoes and other intensely powerful forces of nature were essential to maintaining proper balances in nature; it was only in an instrumental sense that God used them to punish the wicked.<sup>39</sup>

Yet, for a different reviewer in the same periodical, Dick's belief that humanity's depravity was mirrored in nature was considered pertinent and proper. 'The universal language of nature', explained this reviewer, 'is, that man is a sinful being, has offended his Maker, and owes his continuance in life to the forbearance of God; that God is testifying in the storm, the earthquake... his abhorrence of sin....' Furthermore, such evidence of God's activity in nature--plainly visible to all humans everywhere--proved that even those humans who had never seen a Bible knew of God and were therefore 'wholly inexcusable in their sinful and atheistical course of life'.<sup>40</sup> This difference between Olmsted and this reviewer (and Dick) marked an important difference in doctrinal sensibilities within evangelicalism, between those like Olmsted who stressed nature's fundamental goodness as the creation of

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<sup>39</sup> Ibid., 155, 157, 160.

<sup>40</sup> Anon., 'Review of Derham's Physico Theology', *Quarterly Christian Spectator*, 3 (1831), 441-53: 450, 452. This periodical was known as the *Christian Spectator* from 1819 to 1828, and the *Quarterly Christian Spectator* from 1829 to 1838.

God's benevolent hands, and those like Dick who stressed the enormity of sin, its corruption of nature, and the continuing sternness of God's response.

Returning to Olmsted's review, it is interesting to note the way in which he classified works on nature and theology, and the category in which he placed Dick's book. Olmsted divided these works into three categories: those which sought rational proofs of the being and attributes of God, as exemplified by Paley's *Natural Theology*; those which eschewed laboured proofs and took a poetic and devotional approach to God's wonders in nature, as exemplified by James Hervey's *Meditations and Contemplations*; and those which blended these two approaches, whose authors strove to supply rational accounts of nature, but who were often, and quite understandably, overcome by the beauty of God's productions. Into this third category Olmsted placed Dick's work. Whereas Paleyan natural theology was better suited, in its 'cool, unimpassioned, candid, skilful arguments', to overcome the disbelief of sceptics and atheists, Olmsted stated that Dick's devotional and God-praising theology of nature was better suited to edify believers.<sup>41</sup>

Praising Dick's *Christian Philosopher* in similar terms was an anonymous reviewer in the *Christian Examiner* (mouthpiece of the Unitarians). Like Olmsted, this reviewer noted that Dick's work broke little new ground, but it did have compensatory merits:

the great extent of its plan and the great variety of topics which is made subservient to its purposes; the strong sentiment of devotion and religious feeling which pervades it, and generally the very correct views of the nature, attributes, and providence of God which it undertakes to illustrate.

For the *Christian Examiner*, a Christian who read Dick's work could not help but 'feel his piety elevated, his views of the divine power, wisdom, and goodness enlarged and strengthened, [and] his confidence in the overruling and

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<sup>41</sup>D. Olmsted, 'Christian Philosopher', 154-55.



ever present providence of the Deity confirmed'.<sup>42</sup>

However, evangelical publications were at times more cautious in their claims as to the authority of forms of knowledge which leaned too heavily on human reason. One reviewer wrote of Dick's *Improvement of Society* that 'we might hesitate to allow so much to mere illumination of the mind, as Dr. D. sometimes seems to allow to it'. Some of Dick's more spectacular and speculative claims seemed to this reviewer to be establishing a disturbing precedent:

The simplicity of the gospel might be endangered, by certain hints thrown out, concerning the condition of other worlds, and especially concerning some of the employments of the inhabitants of heaven. To support the author's favorite views on these subjects, might require a latitude in the construction of the scriptures, similar to that, which the geologist has sometimes adopted, in explaining the days in the Mosaic account of the creation...

Yet, because Dick was so transparently pious and included so many devotional utterances in his works, the scales ultimately tipped in his favour:

Perhaps, however, these notions of Dr. Dick, on a few topics of this kind, can do no hurt, especially if they are connected with many serious and correct discussions on the vital principles of true religion; and they may possibly do some good, by drawing the attention of persons in the higher walks of life, to the truths and duties circulated in the bible.<sup>43</sup>

Less theologically sensitive periodicals, in contrast, generally applauded Dick's more outlandish speculations. In *The Critic*, William Leggett enthused that Dick's *Future State* was

replete with deeply interesting speculations, and though it is highly probable that many may not entirely concur with some of the author's ingenious theories, yet no one can read them without instruction and delight. His notions... are all exceedingly novel, exceedingly

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<sup>42</sup>Anon., 'Review: The Christian Philosopher', *Christian Examiner*, 5 (1828), 14-15.

<sup>43</sup>Anon., 'General Improvement of Society', *Quarterly Christian Spectator*, 6 (1834), 632-54: 638, 648-49.

ingenious, and strongly sustained.... uncommonly captivating.<sup>44</sup>

From the early 1830s onwards, the consensus view of Dick's works among less theologically sensitive periodicals was perhaps best summed up by *The Western Monthly Magazine*. Of Dick's first four books an anonymous reviewer wrote that

These works are too well known to need any commendation from us.... [they] may be recommended, as well as to the christian who desires to know the reason of the faith that is in him, as to the student of science who would learn how the rules of scientific and moral truth are blended together.<sup>45</sup>

By 1830, the *Christian Philosopher* was being commended in the same breath as Ray's *Wisdom of God* and Paley's *Natural Theology* as a work which demonstrated that science supported Christianity.<sup>46</sup> Thereafter, Dick acquired a reputation for piety and probity which thenceforth was rarely challenged. One writer in 1836 gushed that Dick

is doing more, probably, in the cause of correct thinking and principles than any man living. His works have a most extended sale in every part of this country, and they are cherished with an affection commensurate with their great value.<sup>47</sup>

*The Hartford Watchman*, a weekly religious newspaper edited by Joseph Harvey, a Congregational minister, concurred, noting that there were few Americans 'of any considerable moral acquirements, who are not more or less acquainted' with

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<sup>44</sup> *The Critic: A Weekly Review of Literature, Fine Arts, and the Drama*, 2 (9 May 1829), 7-10, on 9. For similar sentiments see 'Letter from R.D.', *The Poughkeepsie Casket*, 2 (Mar. 1839), 189. On Leggett's *Critic* see F.L. Mott, *A History of American Magazines 1741-1850* (Cambridge, 1930, 1938), 355-56.

<sup>45</sup> *The Western Monthly Magazine*, 4 (Nov. 1835), 347-48. An eclectic publication, this magazine had about three thousand subscribers, according to Mott, *American Magazines*, pp. 595-98.

<sup>46</sup> 'Review of Butler's *Analogy of Natural and Revealed Religion*', *Quarterly Christian Spectator*, 2 (new ser., 1830), 694-719: 696.

<sup>47</sup> Anon., 'Review of *Mental Illumination*', *Waldie's Journal of Belles Lettres*, 9 (1 Mar. 1836), part 1, n.p. For similar positive reviews see *The New Yorker*, 4 (Mar. 1838), 829; J.H. Morison, 'Review of *Improvement of Society*', *Christian Examiner*, 15 (Jan. 1834), 350-64; 'Review of *Mental Illumination*', *The Boston Pearl. A Gazette of Polite Literature*, 5 (Apr. 1836), 255; 'Popular Education', *American Quarterly Review*, 20 (Dec. 1836), 315-50.

Dick's works. Moreover, 'most, if not all' of his works were 'in the library of nearly every clergyman' in New England.<sup>48</sup>

Not everyone celebrated this last fact, however. Olmsted complained to his fellow astronomer Elias Loomis in 1843 that

Our clergy read nothing better than Dick's works--[J.P. Nichol's] *Architecture of the Heavens* and [Dionysius] Lardner's lectures, exported by the New York [?] (full of gross errors). Indeed, the clergy know nothing of the late discoveries among the stars.<sup>49</sup>

Olmsted plainly found Dick's works wanting in scientific rigour, and he asked Loomis to pen a review of his own popular text on astronomy (*Letters on Astronomy*),<sup>50</sup> which he seemed to think represented a significant improvement.

Olmsted was not alone in expressing reservations as to the rigour of Dick's works. A 'Society of Clergymen', united in calling for a more logically precise and scientifically rigorous natural theology, observed that 'Hill, Dick, Knapp, Storr and Flatt, have done very much less... than had been accomplished by their predecessors' like Ray and Samuel Clarke. For these clergymen, Dick's and the others' natural theology was not sufficiently 'original' or 'systematic'. They praised instead Henry Brougham's *Discourse of Natural Theology*.

In drawing the ire of this 'Society of Clergymen', Dick was in good

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<sup>48</sup> 'Review of Mental Illumination', *Hartford Watchman*, no. 11, 14 Mar. 1836, p. 44. W.N. Griggs also claimed that the *Christian Philosopher* was 'enthusiastically popular among the religious community of every denomination, and... universally familiar'. Griggs, *The Celebrated 'Moon Story'* (New York, 1852), pp. 17-18. These claims are supported by Caroline Sloat's *Documenting the Parsonage Library*, a study of parish libraries kept at the Old Sturbridge Village historical society in Massachusetts. My thanks to Ms. Sloat, who is currently the assistant editor, Department of Research and Publication, at the American Antiquarian Society.

<sup>49</sup> D. Olmsted to E. Loomis, 21 June 1843, Loomis Papers, Beinicke Rare Book and Manuscript Library, Yale Univ., cited in Schoepflin, 'Olmsted', p. 205.

<sup>50</sup> Ironically, Olmsted quoted lengthy passages from Dick's *Celestial Scenery*. See chapter eight, section two.

company, for they also attacked Thomas Chalmers. In suggesting that natural theology was useful only as a stimulus to Christianization or conversion, Chalmers had underestimated its importance, they alleged. He had also replied to Hume's arguments against the design argument 'on the skeptic's own ground', rather than employing Reid's common-sense argument that experience taught us that contrivance necessarily implied a contriver. They concluded that 'the laws of belief which govern our reasonings in Natural Theology, ought to be made more conspicuous, recognized more distinctly as authoritative, and exhibited in a more scientific order than they have been'.<sup>51</sup>

Yet modern divines continued to be indifferent to natural theology, or so these clergymen alleged. They identified four causes for this indifference: fear that the more nature was esteemed, the less Scripture would be; the notion that natural theology was too philosophical when compared to the 'humble spirit' fostered by Scripture; the conviction that natural theology was too conjectural or obscure and plagued by the failings of human reason; and the belief that natural theology was simply superfluous when compared to Scripture.<sup>52</sup> For these clergymen, these were all misbegotten and misplaced concerns.

That this 'Society of Clergymen' found Dick's contribution to natural theology somewhat lacking shows that they failed to grasp the general thrust of Dick's work. Showing a firmer grip was the Presbyterian Princeton Review, which praised the *Christian Philosopher* for the way in which it fostered devout feeling by 'enlarg[ing] and vivify[ing] our conceptions of the greatness and glory of God'. By teaching one about the material universe in

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<sup>51</sup>[Society of Clergymen], 'Natural Theology', *Bibliotheca Sacra*, 3 (1846), 241-84: 242-43, 266-67. This periodical--the voice of Andover Presbyterians--was known for its erudite and intellectually rigorous approach to theology.

<sup>52</sup>*Ibid.*, 244-45.

a devotional context, it showed 'that science in its great results vindicates faith, and destroys the very foundations of scepticism'.<sup>53</sup>

These last two senses constituted the essence of Dick's appeal. That Dick's works might be found lacking in rigour by experts in science and natural theology was shown by the critiques of Olmsted and the 'Society of Clergymen'. Yet most reviewers preferred to emphasize how Dick's works gave rise to devotional feelings, 'correct thinking' about God, and confidence in the ultimate reconcilability of science and religion. Judged from a modern perspective, Dick's works appear to have been rather uninnovative discourses, whether in science or in natural theology, and therefore historians have tended to undervalue and neglect them. Yet, given their enviable publishing record and the positive reviews which they garnered, what emerges with great clarity and force is antebellum America's great enthusiasm for them. Those who dismiss Dick and his works risk underestimating the religiosity of antebellum American culture and Americans' deep respect for pious theologians of nature like Thomas Dick. As the next section seeks to show, Northern evangelicals of a reformist bent had especially strong reasons to applaud Dick's works.

### 7.3 Common Cause with Northern Evangelicals: Dick, Abolitionism and Pacifism

Two of the more important reasons why some Americans in the North and West accorded Dick considerable respect were the strong stances he took against slavery and war. In these he had much in common with evangelicals like William Lloyd Garrison, Harriet Beecher Stowe and the 'learned blacksmith'

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<sup>53</sup>Anon., 'Short Notices: The Christian Philosopher', *Princeton Review*, 29 (new ser., 1857), 547. Natural theology served similar roles in a Unitarian context, as shown by D.W. Howe, *The Unitarian Conscience*, ch. 3.

Elihu Burritt (1810-79).<sup>54</sup> Dick wrote what one author has termed 'the sharpest arraignment of slavery ever to appear' in Burritt's *Christian Citizen* (a weekly newspaper which at this time was read in 1200 towns in America).<sup>55</sup> This section addresses Dick's views on slavery and war and how they interacted with antebellum American society.

In Dick's friendship with Burritt, one discovers clear-cut evidence of the appeal of Dick's stance against slavery and war. Having corresponded in the 1830s with Elihu's brother Elijah, Dick formed a close relationship with Elihu after Elijah's death in 1838, with Elihu visiting Dick for six days in the spring of 1847.<sup>56</sup> A self-taught linguist, pacifist, and campaigner for temperance and against slavery, Burritt was much like Dick: pious, morally earnest, possessing a reformist bent but opposed to radical changes in social structures, idealistic and in some respects politically naïve. Given their commonalities, it is not surprising that Burritt recruited Dick to write against slavery for his *Christian Citizen*.<sup>57</sup>

The steadfastness of Dick's opposition to slavery can be seen in three separate letters which he sent to American correspondents. For their eloquence and for what they reveal of Dick's character and thought, I shall

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<sup>54</sup> Stowe visited Dick during her tour of Britain in 1853. See Dick to W.B. Sprague, 11 Oct. 1854, DCA GD/x33/2/6. Garrison visited Dick probably in Sept. 1846, but his multi-volume collected letters contain no reference to his visit.

<sup>55</sup> P. Tolis, *Elihu Burritt: Crusader for Brotherhood* (Hamden, Conn., 1968), p. 107. Dick's essay on slavery appeared in ten successive numbers of the *Christian Citizen* in the first half of 1845 (I have not been able to find a copy of this essay). Burritt intended to publish this as a pamphlet of about forty or fifty pages, but it would seem that this was never done. On the *Christian Citizen* see M.E. Curti, *The American Peace Crusade 1815-1860* (Durham, North Carolina, 1929), p. 147.

<sup>56</sup> Dick to L.B. Johnson, 8 Jan. 1848, Houghton Library, Harvard Univ., bMS AM 1953(531).

<sup>57</sup> See M.E. Curti, *The Learned Blacksmith: The Letters and Journals of Elihu Burritt* (New York, 1937); and Tolis, *Elihu Burritt*. Burritt was nominally a Congregationalist.

quote these letters at length. In the first letter, written in early 1848 to Lucius Brutus Johnson (1805-53), an educator who with his wife had opened the Dallas Male and Female Academy in Selma, Alabama in 1844, Dick declined an unspecified position and a generous salary which Johnson had offered him, citing advanced age and fragile health. Yet, in a remarkably forthright passage, Dick declared that

the idea of going to reside in a Slave State, would be repugnant to my sentiments and feelings, and would of itself form an insuperable barrier in my way; more especially when you say, "Your settlement here would enable you to judge advisedly upon the great question of Slavery as it now exists in the United States, also to see and feel the utter impracticability, not to say impossibility of a partial, or even of a gradual emancipation". I must confess I was very forcibly struck, and not a little astonished at the sentiment here expressed. For I had always considered that the system of slavery was only a temporary evil to the world... that it was considered as an incubus lying on the Southern States, which they would wish if possible to throw off...

The South's moral crime of slavery, in Dick's opinion, led Southerners to support the even more reprehensible crime of war and retarded significantly the moral and material progress of Southern society:

[T]he Divine Being has set his mark of displeasure upon slavery... and the S. States have suffered a part of the punishment... Otherwise, Why are they so far behind the Northern States in physical and mental energy? Why are their lands in a far lower state of cultivation? Why are they so far excelled by the Northerners in literature and Science, and in the vigorous and energetic cultivation of the useful arts? Why are they comparatively poor, notwithstanding their robbery of the wages of the slave? and why is labour--which is essentially necessary to the health and happiness of man--considered as disagreeable in the Sn. States? All these and numerous other evils are part of the punishment which the Moral Governor of the world has annexed to the system of slavery...<sup>58</sup>

Compared to the sobriety of most of Dick's writings, the depth of emotion displayed here is refreshing and revealing. His sense of moral outrage is palpable, and clearly it is Biblically-inspired. Moreover, in his ability to distil succinctly the anti-slavery position in America, he demonstrated considerable perception and skill. Slavery for Dick was an

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<sup>58</sup>Dick to L.B. Johnson, 8 Jan. 1848.

incubus whose immoral intercourse not only sullied Southern society but also sapped the strength of Christian efforts to advance the millennium.

A little more than one year later, Dick wrote with the same vigour a second letter deploring slavery. In this letter, he criticized Frederick Douglass for the harsh language with which he had attacked President Zachary Taylor. Yet Dick expressed admiration for Douglass's intellect and moral qualities, observing that, if Douglass could somehow become a member of the House of Commons, he would exceed most of its members 'in point both of sentiment and elocution'. Douglass, Dick suggested, would never win a fair hearing in America precisely because he was 'a coloured man' and an ex-slave. America's antipathy to coloured people, Dick wrote,

is one of the most unreasonable prejudices that I know, and... is not to be found so deeply prevalent in any other nation.... It implies in it a virtual slur and reproach on the Creator, for having thought proper to form a certain portion of his creations of a certain colour.<sup>59</sup>

Dick's knowledge and praise of Frederick Douglass show that he kept well abreast of debates over slavery and was unafraid to express himself boldly. Yet his criticism of Douglass's rhetoric reveals Dick's inherent caution. Dick favoured societal reforms, but these were to be achieved through peaceful means and not through potentially inflammatory rhetoric which could lead to violent disruptions in society. Dick's preference for measured approaches could not conceal his absolute antipathy towards slavery, however. That God would create men and women of darker skin as inherently inferior humans to be exploited by their 'superiors' was to Dick an idea as inconsistent with God's benevolence as it was loathsome and morally repugnant.

In a third letter, written five years later to his friend and faithful correspondent William Buell Sprague, Dick again revealed his Christian fervour as well as his naïveté, declaring that

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<sup>59</sup>Dick to a lecturer, perhaps John Reid, 29 May 1849, NLS MS 11000 ff 43-4.



I am perfectly astonished that, hitherto, no reasonings, no appeals to humanity and justice, no appeals to the principles and precepts of Christianity have been sufficient to convince the abettors of this system of the wickedness and injustice of this enormity, or to lead them to devise measures for its destruction. Of all the systems of slavery of which we read in Sacred or prophane history, there is none which appears to me so atrocious as that which abounds in America.... Till this system be abolished the American States will continue to be "a hissing and a byword among all civilized nations".

He added that it was the 'general opinion' in Britain that it was America's churches and Christian institutions which were most responsible for the perpetuation of slavery, a thesis he believed was upheld in Harriet Beecher Stowe's *Key to Uncle Tom's Cabin*.<sup>60</sup>

Adamantly opposed as he was to the South's 'peculiar institution', Dick was even more outspoken in his opposition to war. As we have seen, he decried the Southern states for their support of the Mexican-American war, and he did not spare his own country when it became involved in the Crimean War. In the same letter to Sprague, Dick lamented that

We have again gotten involved in the horrors of War - an evil still more to be deprecated than even slavery. The slaughters which have already taken place are numerous, and the cholera has at the same time carried off its thousands. It appears very strange, and unaccountable on rational principles, that civilized and Christian nations cannot think of settling disputes by Arbitration....<sup>61</sup>

Here Dick found comfort in Isaiah 2:4, idealistically writing that, one day, nations would beat their swords into plowshares and abandon war.

Hoping to turn idealism into reality, Dick became actively involved in efforts to end war. Scattered throughout his writings are passages condemning militarism and demonstrating the deadly costs of human conflict. He supported

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<sup>60</sup>Dick to Sprague, 11 Oct. 1854, DCA GD/x33/2/6. Stowe's work had been sent to Dick by John A. Elkinton, who stated it was 'a truthful picture of the only blemish among our free nation of people & institutions'. Elkinton to Dick, 28 July 1852, DCA GD/Mus/54/9/9.

<sup>61</sup>Dick to Sprague, 11 Oct. 1854, DCA GD/x33/2/6.

Burritt's 'Pledge of Peace' and League of Universal Brotherhood (1846),<sup>62</sup> attended the Peace Congress in Frankfurt am Main in 1850, and in the 1850s subscribed to the Society for the Promotion of Permanent and Universal Peace.<sup>63</sup>

In inveighing against slavery and war, Dick exhibited passion which requires some explanation. Taken at face value, his passionate pleas in favour of abolitionism and pacifism were motivated by a Christian desire to eliminate what he saw as crimes of such enormity against humanity as to inhibit completely progress towards the millennium. Yet was he in some way expressing deeper psychological needs or desires? As C. Duncan Rice has noted, abolitionists' motives were often bewilderingly complex, with slavery becoming symbolic of sin and with abolitionists seeing themselves as Christ-like redeemers. Interestingly, Scottish Seceders cultivated an image of themselves as a religious minority held in thrall by the Established Church. This could possibly have made them more prone to identify with the plight of Southern slaves.

Yet Antiburgher Seceders had condemned the slave trade and called for the emancipation of all slaves as early as 1788. By 1830, all respectable and literate Scotsmen, if asked, would have spoken out against slavery.<sup>64</sup> Dick shared in this sentiment. He was not an especially self-righteous crusader with pretensions to moral perfection. Rather, like many conscientious evangelicals on both sides of the Atlantic, he opposed slavery and war as

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<sup>62</sup>Dick also wrote in c.1845 an article against war for the *Advocate of Peace* while Burritt was its editor. On Burritt's efforts to end war, see P. Brock, *Radical Pacifists in Antebellum America* (Princeton, 1968), pp. 195-220; and Curti, *American Peace Crusade*, pp. 143-65.

<sup>63</sup>He paid 10s.6d. on 9 June 1854 for this subscription: see NLS MS 9658 ff 148.

<sup>64</sup>C.D. Rice, *The Scots Abolitionists 1833-1861* (Baton Rouge, 1981), esp. pp. 14, 23, 54.

moral evils which were contrary to God's teachings.<sup>65</sup> Eradicating slavery and war was essential to the regeneration of the international social order in preparation for the millennium.

#### 7.4 Relief Efforts Mounted for Thomas Dick in America

His works 'abound with the noblest and purest sentiments--sentiments calculated to strengthen the religious faith of the human mind and heart, and to brighten our highest and holiest hopes of immortality. And yet such a man--such a sage, philosopher and philanthropist--is now in comparative want'.

Robert Morris, Editor, Philadelphia Pennsylvania Inquirer, 1850<sup>66</sup>

Testifying to Dick's immense popularity in America were three relief efforts mounted on his behalf. Elihu Burritt launched the first effort. In his visit to Dick in 1847, Burritt learned of his friend's financial burdens and somewhat delicate health.<sup>67</sup> Upon returning to America, Burritt urged readers of the *Christian Witness* to contribute to a fund for Dick's relief. Dick's works, Burritt declared, had been

read by millions in America, who will readily attest their worth. In proof of this, the venerable author has received perhaps hundreds of communications from individuals in America, expressing the warmest sentiments of respect and admiration for his writings. But how little they realized that those who were reaping fortunes in America by the publication and sale of his books, did not drop a grain of their profit for him to administer comfort to his declining years! No! the postage on the very letters from America which testified to the value of his works, oftentimes robbed his table of every thing save the vegetables

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<sup>65</sup>V.B. Howard, *Conscience and Slavery: The Evangelistic Calvinist Domestic Missions, 1837-1861* (Kent, Ohio, 1990); C.C. Cole, Jr., *The Social Ideas of the Northern Evangelists 1826-1860* (New York, 1954, 1977); and B. Fladeland, *Men and Brothers: Anglo-American Antislavery Cooperation* (Urbana, Illinois, 1972).

<sup>66</sup>*Pennsylvania Inquirer*, 35 (12 Jan. 1850), no. 6, p. 4, c. 1-2.

<sup>67</sup>In 1847 Dick was bedridden with two attacks of inflammatory fever, the second made worse by an attack of influenza.

which he cultivated with his own hand in his garden.<sup>68</sup>

Burritt attributed Dick's grim financial situation in part to the depredations of American publishers, who happily made 'fortunes' by pirating his works, refusing to pay him a cent since they feared that to do so would set a dangerous precedent for their trade.<sup>69</sup>

Given his ailments and financial burdens, Dick was happy to receive contributions from his American admirers, writing to Burritt in 1848 that

A little addition to my present income would certainly be acceptable; and if your American brethren were to come spontaneously forward to offer a sum as a Testimonial that they had derived some benefit from my writings, I certainly would not refuse it. For they have been enabled to possess my writings at a much cheaper rate than in this country, in consequence of my not having a copy right in America. But I would not urge any such claim, unless it seemed to be granted spontaneously.<sup>70</sup>

The crucial word here is 'spontaneous', for like many evangelicals Dick insisted that charity be uncalculated and from the heart.

Burritt's fund-raising campaign was a modest success. An account book which survives lists nearly 130 contributions, totalling \$149.01, or about £27.<sup>71</sup> The average donation was slightly more than one dollar, but many people sent in dimes or quarters (forty-two, or about one-third, of the contributors gave 25 cents or less), with two 'little' boys and one girl pooling their pennies and sending in fourteen cents. Most donors supplied their names and place of residence, and the professions of twenty of these can

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<sup>68</sup> 'Real Life. Genius and Misfortune. The Poor Author', *Pennsylvania Inquirer* (Philadelphia), 35 (12 Jan. 1850), no. 6, p. 4, c. 1-2 (reprinted from the *Christian Citizen*, n.d.).

<sup>69</sup> *Ibid.* Actually, by this time two American publishers had paid Dick modest sums for his works.

<sup>70</sup> Dick's letter to Burritt, dated 2 Jun. 1848, is cited in *Ibid.*

<sup>71</sup> 'Account Book of James Brown Syme, 1847-48', MSS Syme, American Antiquarian Society, Worcester, Mass. A Mr. J.W. Clock served as treasurer.

be identified through directories.<sup>72</sup> Table 7.3 lists these donors by the amount of their donations, from greatest to least.

Table 7.3 Donors to Burritt's Relief Fund for Dick

Name	City	Occupation	Amount
A. & James Manderson	Philadelphia, PA	lumber merchants	\$20.00
Jacob A. Dresser	Boston, MA	merchant	\$5.00
Alexander Ladd	Portsmouth, NH	merchant	\$2.00
Giles B. Kellogg	Troy, NY	lawyer	\$1.50
Ebenezer Bell	Troy, NY	insurance agent	\$1.00
A.H. House	Nashua, NH	clergyman	\$1.00
Samuel Jennison	Worcester, MA	treasurer at bank	\$1.00
David Merritt	Salem, MA	merchandise agent	\$1.00
George Taylor	Warren, OH	bank cashier	\$1.00
E.H. Bascom	Boston, MA	lamp maker	.50
Theophilus Brown	Worcester, MA	tailor	.50
G. Hapgood	Warren, OH	postmaster	.50
William T. Hildrup	Worcester, MA	car-builder (train?)	.50
Leicester King	Warren, OH	bank director	.50
Pomeroy Knowlton	Worcester, MA	sashmaker	.50
George Parsons	Warren, OH	bank president	.50
W.N. Porter	Warren, OH	associate judge	.50
Benjamin Stevens	Warren, OH	cloth dresser/carder	.50
M.B. Taylor	Warren, OH	bank teller	.50
George C. Stillman	New London, CT	machinist	.25

These contributors were in the main solidly middle-class, with a few members of the professional classes taking part. The lamp maker, sashmaker, and machinist might be counted as skilled artisans. This list, however, probably under-represents the working-classes. Recalling that forty-two donors sent in 25 cents or less, one might suppose that at least some of these donors were members of the working-classes.

Perhaps inspired by Burritt's call, the agriculturist Stephen Lincoln Goodale (1815-97) mounted a small relief effort in 1850 which raised L6 for Dick. Goodale, who later gained prominence as a scientific breeder and in 1856 became the first Secretary of State of the Board of Agriculture, wrote

<sup>72</sup>Professions identified by using the Research Publications microfiche series of American Directories through 1860 (New Haven, Conn., n.d.).

to Dick from Saco, Maine that 'a few friends in this vicinity' were happy 'to testify to their grateful esteem for you personally & to pay a slight installment towards the indebtedness of the American public for your valuable labors'.<sup>73</sup> The local newspaper concurred, adding that America owed him a 'debt of gratitude' for 'the healthful moral and religious influences of his literary works'.<sup>74</sup>

The third effort launched for Dick's relief was more extensive and better organized than Burritt's and Goodale's fund-raising schemes, relying on both voluntary contributions and money generated from the sales of Dick's works. John A. Elkinton, a physician and city alderman for Philadelphia, took the lead. Receiving the go-ahead from Dick,<sup>75</sup> Elkinton recruited Edward C. Biddle, whose participation was crucial. Biddle made available a set of Dick's works, ten volumes in five, containing 3700 pages, which he priced at \$4.00 per set. For each set sold, he generously contributed \$2.00, all his profits per set, to Dick's relief.<sup>76</sup>

With Biddle on board, the 'friends of Dr. Dick' first met on 16 February 1850 at the Law Buildings in Philadelphia. Elkinton was appointed secretary, Kingston Goddard, an Episcopal minister, was elected chairman, Biddle volunteered as treasurer, and a twenty-four-man committee was formed to solicit donations on Dick's behalf. Preceding the creation of this committee, the following preamble was read by Elkinton and unanimously adopted:

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<sup>73</sup>Goodale to Dick, 8 Jan. 1850, DCA GD/X264/9. Goodale kept his secretaryship for seventeen years. A strong supporter of the diffusion of knowledge, he helped to found Maine's land-grant college. See DAB, VII, 379.

<sup>74</sup>'Letter from Dr. Dick', *The Saco Democrat*, 21 (5 Mar. 1850), no. 30, p. 3, c. 1.

<sup>75</sup>Dick to J.A. Elkinton, 9 Jan. 1850, published in 'Dr. Thomas Dick', *The Dollar Newspaper* (Philadelphia), 20 Feb. 1850, c. 7.

<sup>76</sup>'Relief for the "Christian Philosopher"', *M'Makins Model American Courier*, 19 (19 Jan. 1850), no. 46, p. 2, c. 5.

Whereas, in the inscrutable dispensations of Divine Providence, great domestic affliction, superadded to poverty, has entered the abode of THOMAS DICK, the venerable Christian philosopher and philanthropist, of Broughty Ferry, Scotland, now in the winter time of life--a life pre-eminently devoted to the moral elevation and religious improvement of mankind--an author whose writings have Christianized science and turned men's thoughts from worldly objects to the contemplation of God and his attributes, and infused into the family and social circle the charms of piety: And whereas, it is believed there are many persons in this community, professing Christians and others, who would esteem it a privilege to contribute to the relief of one so highly distinguished, if a convenient opportunity were offered...<sup>77</sup>

Table 7.4 lists the committee members and their occupations.

Table 7.4 Committee to Solicit Funds for Dick's Relief, Philadelphia, 1850

Name	Occupation
Agnew, William G.E.	minister and teacher
Allibone, Samuel Austin	merchant (and lexicographer, librarian, author)
Ashmead, Samuel B.	merchant
Atwood, John M.	merchant
Biddle, E.C.	publisher (committee treasurer)
Cleveland, Charles Dexter	professor at the Young Ladies' School
Cressy, James	unknown
Dawson, M.L.	gentleman
Donnell, C.	cashier, Bank of Commerce
Elkinton, John A.	physician and city alderman
Goddard, Kingston	Episcopalian minister (committee chairman)
Grigg, John	bookseller
Johnson, Lawrence	unknown
McMichael, Morton	editor, Godey's Lady Book and North American (later mayor of Philadelphia, 1866-69)
Moore, John Weeks	bookseller
Morris, Robert	editor of the Pennsylvania Inquirer
Nathans, Nathan	unknown
Negus, J. Engle	unknown
Okie, J.B.	inspector of woollens
Peacock, James	editor and publisher of the Evening Bulletin
Strathers, William	unknown
Swain, William M.	editor and publisher of the Ledger
Truman, George	physician
Vogdes, William	attorney and professor at Central High School

Overall, this committee attracted many of Philadelphia's most respectable citizens. Ministers, physicians and attorneys signed on, as did several

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<sup>77</sup> Philadelphia Public Ledger, 28 (20 Feb. 1850), no. 127, p. 2, c. 2. See also issues on 18/19 Feb. 1850, p. 2, c. 2 for further reports, and 'Friends of Dr Dick', The Saturday Gazette (Philadelphia), 11 (23 Feb. 1850), p. 3, c. 3.

editors and publishers and three merchants. The venue of the meeting (the Law Buildings) and the fact that this first meeting took place on a Saturday during business hours may have worked against merchants.

As fund-raisers these men enjoyed considerable success. Robert Morris urged his readers to contribute, and as early as 15 January a certain 'A.L.' had sent in \$2.00 with a note which read: 'I think it is the duty of every man to contribute to the relief of one who has spent his whole life for the improvement of mankind'. By 18 February Morris's *Pennsylvania Inquirer* had collected \$52.00.<sup>78</sup> Indeed, the city of brotherly love took pride in its generosity, with one newspaper claiming that

While sales of Dr. Dick's numerous works have been making fortunes for the English booksellers, they have suffered him to become weighed down by sorrow, penury and years, comparatively uncared for, and unknown; but now that our countrymen have taken the matter in hand, there is every prospect that the evening of the good old man's days will be gilded with a genial ray of happy sunshine.<sup>79</sup>

Along with contributors of cash came 144 subscribers to Biddle's complete set of Dick's Works. Biddle kept a subscription list for Dick's benefit which survives today. The 144 subscribers to Dick's Works are listed in the appendix, sorted both alphabetically and by occupation. The list included several prominent individuals, most notably the Bishop of Pennsylvania, the Rt. Rev. Alonzo Potter, together with six other ministers. This list plainly shows that intelligent and influential people of Dick's time shared an interest in his works. Table 7.5 provides occupational percentages for these subscribers.<sup>80</sup>

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<sup>78</sup>Letter from 'A.L.' on 'The Case of Dr. Dick', *Inquirer*, 35 (15 Jan. 1850), no. 7, p. 4, c. 1-2; *Inquirer*, 42 (19 Feb. 1850), no. 43, p. 2, c. 1.

<sup>79</sup>'Dr. Thomas Dick', *M'Makins*, 19 (23 Feb. 1850), no. 51, p. 2, c. 2.

<sup>80</sup>Occupations determined through microfiche series of *American Directories through 1860* (New Haven, Conn., n.d.); DAB; H. Simpson, *The Lives of Eminent Philadelphians, now deceased* (Philadelphia, 1859); and various contemporary Philadelphia newspapers.



Table 7.5 Occupational Percentages of Subscribers to Dick's Works

Occupation	Number	Percentage
Attorney or Judge	16	11%
Physician or Dentist	5	4%
Minister	7	5%
Teacher	1	1%
Editors/Publishers/Booksellers	9	6%
Gentlemen	3	2%
Manufacturers	2	1%
Stock Brokers	4	3%
Druggists	3	2%
Importers	3	2%
Dry Goods or Hardware	4	3%
Merchants	34	24%
Other Tradesmen/shopkeepers*	14	10%
Technical#	4	3%
Indef./Unlisted/Unknown@	33	23%
Miscellaneous**	2	1%

Notes

\* 1 each brewer, bricklayer, chinaware, crockery ware, grocer, perfumer, silk and fancy goods, stationer, tailor, tanner, tobacconist, trimmings; 2 milliners.

# 1 each daguerreotypist, inspector of woolens, manufacturing chemist, surgical instrument maker.

@ 'Indefinite' means two or more people listed in directories with identical names. 'Unlisted' means occupation not supplied in directories. 'Unknown' means person not listed. For the complete list, see the appendix.

\*\* 1 each cashier, insurance salesman

The leaders of the subscription effort appear to have been Professor C.D. Cleveland (seventy-five copies), the physician George Truman (fourteen copies), and the minister and teacher William Agnew (twelve copies). Forty copies were ascribed to Biddle, with seventy-two copies being sent directly to Elihu Burritt in Worcester, Massachusetts.<sup>81</sup> It would appear that members of the professions took the lead in enlisting subscribers to Dick's Works, yet merchants clearly emerged as the dominant group of subscribers.

An interesting comparison can be made between the subscribers to Dick's Works and members of the Cincinnati Astronomical Society (hereafter CAS), as

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<sup>81</sup>E.C. Biddle to Dick, 29 Apr. 1850, DCA GDx246.

determined by P.S. Shoemaker.<sup>82</sup> Modifying the categories in table 7.5 to correspond to Shoemaker's, table 7.6 compares members of CAS to subscribers to Dick's Works.

#### 7.6 Subscribers to Dick's Works versus Members of CAS

Occupation (after Shoemaker)	CAS	DICK
merchants, bankers, speculators	25%	27%
professionals (attorneys, physicians, ministers, teachers)	17%	20%
manufacturers	11%	2%
shopkeepers	10%	8%
mechanics/artisans	10%	4%
clerks	5%	--
labourers	1%	--

These percentages reveal no significant differences in the audiences. This tends to confirm the view that the emergent bourgeoisie (merchants, shopkeepers, and so on) and professional classes constituted the main audience for popular science in antebellum America. Many of these bourgeois types were probably much like Arnold Thackray's marginal men: status-conscious, possessing disposable income, and seeking confirmation of their cultural status. These were the men who were easily able to afford a share in CAS or four dollars for a complete set of Dick's works.

To be sure, in purchasing Dick's works, a few of Dick's subscribers may have been seeking merely to demonstrate to their peers their own Christian philanthropy. Indeed, it is quite possible that some subscribers read few or perhaps none of the 3700 pages they now had in front of them. Yet ownership usually carries with it an intention to read which is perhaps as significant in identifying Dick's audience and attitudes towards Dick as actual readership.

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<sup>82</sup>P.S. Shoemaker, 'Stellar Impact: Ormsby MacKnight Mitchel and Astronomy in Antebellum America' (Univ. of Madison-Wisconsin Ph.D. thesis 1991), pp. 83-86.

By selling 141 sets of Dick's Works, Biddle raised \$282 for Dick, which came to L51.13s.8d. Burritt sold a further seventy sets in the Worcester area, contributing an additional L25.13s. Additional cash contributions, amounting to L100, or about \$545, were collected by the committee and sent to Dick on 29 April. According to the *Inquirer*, by early May Philadelphians had collected or contributed nearly \$1200 (L220). Added to Burritt's and Goodale's previous fund-raising efforts, the total sum Americans contributed to Dick's relief approached L300.<sup>83</sup>

As one would expect, Dick was grateful, thanking Biddle in May for the 'munificent donation' and humbly beseeching him, too late as it turned out, to rein in his generosity:

I could not think of taking so large a proportion of the price, which must cause to you a serious loss. One dollar on a copy is not only sufficient, but far beyond whatever I could expect, and I have no desire to accumulate wealth beyond what will procure the most moderate comforts of life, and enable me to promote to a greater extent than I have hitherto been enabled to do, the cause of religion and philanthropy.<sup>84</sup>

These charitable relief efforts, unprompted by Dick, serve to demonstrate, more tellingly than favourable reviews or statistics of books sold, the respect and admiration which many Americans had for 'the Christian Philosopher'. For his moral earnestness, his vigour in advocating societal reforms based on Christian love, and his sincere and liberal evangelical faith, Dick was acclaimed in antebellum America.

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<sup>83</sup> 'The Testimonial to Dr. Dick', *Inquirer*, 42 (8 May 1850), no. 111, p. 2, c. 1. A certain Miss L.S. English, Georgetown, sent ten dollars to Dick on 8 Apr. 1850 'as a testimony of respect & regard from his friend'. DCA GD/X33/1/19.

<sup>84</sup> Letter cited in 'Dr. Thomas Dick. The Timely Tribute--Its Grateful Reception', *M'Makins*, 20 (18 May 1850), no. 11, p. 2, c. 4.

## Chapter 8

## Thomas Dick and Aspects of Popular Astronomy in Antebellum America

In this chapter, the field of view is widened beyond Thomas Dick, arguably the most influential popularizer of astronomy in antebellum America, to take in the rise in prominence of popular astronomy from 1830 to 1860. Popular astronomy as a pursuit was marked by the acquisition of some rudimentary knowledge of the heavens, to include speculations on cosmogony and cosmology. Sources were varied and included astronomical instruments,<sup>1</sup> public lectures or sermons, games and other recreational materials like *Urania's Mirror*,<sup>2</sup> and printed matter such as almanacs, books and periodicals. Under books, one would want to scrutinize not only textbooks and popular treatises on astronomy but also more 'literary' sources, such as the writings of Edgar Allan Poe on cosmology.<sup>3</sup> Moreover, these sources could assume different roles, and perhaps new meanings, in the various social spaces (homes, observatories, schools, and elsewhere) in which astronomy was taught and practised.<sup>4</sup>

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<sup>1</sup>On astronomical apparatus see B. Pike, Jr., *Pike's Illustrated Descriptive Catalogue of Optical, Mathematical, and Philosophical Instruments* (New York, 1856; repr. 1984, with intro. by D.J. Warner); J. Brown and C.S. Francis, *Catalogue of Philosophical and Astronomical Apparatus* (New York, 1836); D.J. Warner, 'Commodities for the Classroom: Apparatus for Science and Education in Antebellum America', *Annals of Science*, 45 (1988), 387-97; S.A. Bedini, *Early American Scientific Instruments and their Makers* (Washington, 1964). The cheapest celestial telescope in Pike's catalogue was \$42.00; 'Improved' telescopes started at \$150, with equatorials at \$300 and \$350. Telescopes were thus priced well beyond the means of workers and were essentially luxury items for the upper-middle-classes and rich.

<sup>2</sup>On *Urania's Mirror*--a set of cards with holes representing various constellations--see P.A. Kidwell, 'Women Astronomers in Britain, 1780-1930', *Isis*, 75 (1984), 534-46: 535.

<sup>3</sup>For a useful bibliography see R.J. Scholnick, 'Bibliography: American Literature and Science through 1989', in Scholnick, ed., *American Literature and Science* (Lexington, Kentucky, 1992).

<sup>4</sup>See the suggestive essay by S.G. Kohlstedt, 'Parlors, Primers, and Public Schooling: Education for Science in Nineteenth-Century America', *Isis*, 81 (1990), 425-45.

Focusing in the main on printed sources, this chapter treats popular astronomy as a manifestation of the wider culture in which it was situated.

In essence, astronomy proved to be a remarkably versatile cultural resource capable of being used in a variety of ways by people with differing interests and commitments.<sup>5</sup> For an emergent élite of American astronomers, astronomy became their profession, their reason for being. Yet the intrinsic value of this academic version of astronomy was contested by other individuals who sought to mould astronomy to their purposes. Astronomy's meaning was not self-evident; rather, it admitted rival definitions which were created and sustained in wider cultural domains. In antebellum America, the religious and moral functions of popular astronomy reigned supreme,<sup>6</sup> a fact for which Dick could take much of the credit. Especially noteworthy was the extent to which Dick infiltrated, and even dominated, the market for popular astronomy books in America. Evangelicals adapted astronomy to advance their specific religious doctrines and beliefs. Astronomy as depicted by writers of children's literature exposed issues of gender, specifically women's knowledge of astronomy and their 'appropriate' role in teaching it. What emerges in this chapter is a complex dynamic of readings of astronomy that reflected the highly variegated nature of the antebellum American mind.

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<sup>5</sup>On the ways in which audiences appropriate and modify popular science, see R. Cooter and S. Pumfrey, 'Separate Spheres and Public Places: Reflections on the History of Science Popularization and Science in Popular Culture', *History of Science*, 32 (1994), 237-67.

<sup>6</sup>Evangelicals, and other Christians as well, tended to subsume morality under Christianity, as noted by J. Turner, *Without God, Without Creed: The Origins of Unbelief in America* (Baltimore, 1985), p. 85.

### 8.1 Astronomy and its Cultural Meanings in Antebellum America

Before 1830, American contributions to astronomy were modest.<sup>7</sup> Observers at Harvard and the American Philosophical Society had made valuable observations during the transits of Venus of 1761 and 1769, David Rittenhouse (1732-96) had earned a reputation in America and Europe as a skilled observer and instrument maker, and Nathaniel Bowditch (1773-1838) was lauded for his *Practical Navigator* and his ongoing translation of and commentary on Laplace's *Celestial Mechanics*. Yet Americans as a people failed to cultivate astronomy. When President John Quincy Adams asked Congress in December 1825 to fund astronomical observatories, or 'light-houses of the skies' as he termed them, Congress famously replied with howls of protest mixed with a measure of derisive laughter at the President's 'light-house' metaphor.

As late as 1832, George Biddell Airy, Plumian Professor of Astronomy and Director of Cambridge University Observatory, confessed 'I am not aware that there is any public observatory in America, though there are some able observers'.<sup>8</sup> Eighteen years later, however, Americans were able to cite a new statement by Airy, who was now Astronomer Royal, that 'The Americans... although late in the field of astronomical enterprise, have now taken up that science with their characteristic energy, and have already shown their ability to instruct their former masters'.<sup>9</sup> Airy's revised judgement highlights the incredible burst of public interest in astronomy in America from 1830 to 1860.

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<sup>7</sup>J.C. Greene, 'Some aspects of American Astronomy, 1750-1815', *Isis*, 45 (1954), 339-58; idem, *American Science in the Age of Jefferson* (Ames, Iowa, 1984). For a critical bibliography see M. Rothenberg, 'History of Astronomy', in S.G. Kohlstedt and M. Rossiter, eds., *Historical Writing on American Science: Perspectives and Prospects* (Baltimore, 1985), pp. 117-31.

<sup>8</sup>Quoted in B.Z. Jones and L.G. Boyd, *The Harvard College Observatory: The First Four Directorships, 1839-1919* (Cambridge, Mass., 1971), p. 37.

<sup>9</sup>E. Loomis, *The Recent Progress of Astronomy; especially in the United States* (New York, 1851), p. iv.

Why this burst of interest in astronomy? Several spectacular astronomical events provided periodic stimulus, including the Leonid meteor showers of November 1833, the return of Halley's comet in 1835, the great comet of 1843,<sup>10</sup> and the discovery of Neptune in 1846. These helped to stimulate the founding of observatories. Yale bought a five-inch Dollond achromatic refractor in 1829;<sup>11</sup> Williams College in Massachusetts dedicated America's first permanent, public observatory in 1838;<sup>12</sup> and in Cincinnati Ormsby MacKnight Mitchel parlayed his immensely popular lectures on astronomy into a subscription which resulted in the purchase of a twelve-inch refractor, the world's second largest, and the founding of Cincinnati Observatory in 1845.<sup>13</sup> Inspired by the great comet of 1843, and not wishing to be eclipsed by upstarts in Cincinnati, Bostonians raised \$25,000 for a new observatory at Harvard and equipped it with a twin to the Russian Czar's fifteen-inch refractor at Pulkovo, then the world's best.<sup>14</sup> By 1860, Americans had eight first-class observatories and at least twenty others with quality instruments

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<sup>10</sup>Visible in daylight, and with a tail measuring between forty to fifty degrees, this remarkable comet was seen by Millerites as confirming their prediction that 1843 would witness Christ's second coming. On Millerites see R.L. Numbers and J.M. Butler, eds., *The Disappointed: Millerism and Millenarianism in the Nineteenth Century* (Knoxville, 1993).

<sup>11</sup>D. Hoffleit, *Astronomy at Yale, 1701-1968* (New Haven, 1992), pp. 20-4.

<sup>12</sup>W.I. Milham, *Early American Observatories* (Williamstown, Mass., 1938). Milham provides a useful list of early American observatories on p. 52.

<sup>13</sup>Three thousand people are said to have attended one of Mitchel's lectures. See J.E. Ventre and E.J. Goodman, *A Brief History of the Cincinnati Astronomical Society* (Cincinnati, 1985), p. 1.

<sup>14</sup>S.S. Genuth, 'From Heaven's Alarm to Public Appeal: Comets and the Rise of Astronomy at Harvard', in C.A. Elliot and M.W. Rossiter, eds., *Science at Harvard University: Historical Perspectives* (Bethlehem, Penn., 1992), pp. 28-54; Jones and Boyd, *Harvard College Observatory*; and 'Harvard College Observatory Sesquicentennial', *Journal for the History of Astronomy*, 21 (1990), 3-106.

as well as their own telescope-making industry.<sup>15</sup>

The fast-paced and steady growth of astronomy in America was a function of the extraordinary breadth of its cultural roles. For example, in founding observatories, Americans were motivated variously by intellectual curiosity, career-building, practical needs of navigation and surveying,<sup>16</sup> and civic and national pride.<sup>17</sup> Civic pride was shown by Cincinnatians in their support of Mitchel and by Bostonians in their response to Cincinnati's challenge. Advocates of astronomy appealed to national pride by writing of America's 'servile dependence on the reprint of the British Almanac' for her navigational needs and warning that the nation's immortality was at stake, for 'The labours of the Greenwich astronomers alone, have added enough to their favourite science, to render conspicuous throughout after ages, their own and their country's names'.<sup>18</sup>

That astronomy had important social uses was a thesis advanced by several writers. 'Stars and planets', one author wrote, 'teach us the great duties of industry--of attending to the business of our own stations, without attempting to occupy those for which we are not qualified--of punctuality--of

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<sup>15</sup>D.J. Warner, 'Astronomy in Antebellum America', in N. Reingold, ed., *The Sciences in the American Context: New Perspectives* (Washington, 1979), pp. 55-75.

<sup>16</sup>Both were essential to a republic with growing commerce and huge tracts of uncharted land. Major William H. Emory led the Boundary Survey, and after 1842 Congress sought to improve navigation by funding the Coast Survey, led by Alexander Dallas Bache, and the Naval Observatory, commanded by Lieutenant James M. Gilliss.

<sup>17</sup>M.A. James, *Elites in Conflict: The Antebellum Clash over the Dudley Observatory* (New Brunswick, 1987), p. 11. On patronage and observatories see H.S. Miller, *Dollars for Research: Science and its Patrons in Nineteenth-century America* (Seattle, 1970), ch. 2.

<sup>18</sup>J. Courtenay, *An Inquiry into the Propriety of Establishing a National Observatory* (Charleston, 1827), pp. 5-7. Complaints about America's dependency were still being aired in 1841. See J.R. Poinsett, *Discourse, on the Objects and Importance of the National Institution for the Promotion of Science* (Washington, 1841), pp. 10-11.



doing our utmost to live peaceably with all men....'<sup>19</sup> Such implicit references to astronomy as a bulwark to existing social structures, common as they were in British literature of this period and intended as a naturalistic response to the claims of Chartists and other radicals, were uncommon in American literature.<sup>20</sup> Americans did frequently draw moral inferences from science, but they rarely made these class-specific. The imagery they employed was not that of obedient planets (or subjects) revolving in a rigid hierarchy about a monarchical Sun but that of worshipful planets working to fulfil their God-given potential while revolving about the 'glorious Centre of excellence and love'.<sup>21</sup> Such didactic uses of astronomy suggest that popularizers quickly concluded that it was an effective means to educate the masses.<sup>22</sup>

Two additional reasons why astronomy became an important cultural resource were its perceived scientific authority and, the Nebular Hypothesis excepted, its comparatively innocuous connection with Christian teachings. With respect to the first reason, astronomy was considered to be the most perfect science because it was inductive, mathematical, and law-bound. It was the science which writers in periodicals most often called upon when they sought to illustrate the authority and breadth of applications of natural laws.<sup>23</sup> With respect to the second reason, astronomy, when contrasted with geology and its disturbing implications for the Genesis creation story,

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<sup>19</sup>J. Emerson, *Outline of a Course of Astronomical Lectures* (Boston, 1819), p. 55.

<sup>20</sup>H. Kuritz, 'The Popularization of Science in Nineteenth Century America', *History of Education Quarterly*, 21 (1981), 259-74: 261-63.

<sup>21</sup>J. Emerson, *Course of Astronomical Lectures*, p. 55.

<sup>22</sup>D. Zochert, 'Science and the Common Man in Ante-bellum America', *Isis*, 65 (1974), 448-73, esp. 449-53; J.C. Burnham, *How Superstition Won and Science Lost* (New Brunswick, 1987), pp. 32-37, 128-51.

<sup>23</sup>J.F. McElligott, 'Before Darwin: Religion and Science as Presented in American Magazines, 1830-1860', (New York Univ. Ph.D. thesis 1973), pp. 58, 158-59, 180-81.

emerged as one of the least controversial of the sciences.

Yet as astronomy became a cultural resource, it proved to be a less than straightforward exercise to define 'astronomy' or to determine who deserved the title of 'astronomer'. Contending that D'Alembert, Lagrange and Laplace were manifestly not astronomers, one writer accused these men of not 'heeding the inner sense of its [the book of Nature's] life-giving spirit'. He concluded that 'A well constructed orrery, so made as to exhibit perfectly all the phenomena... [of celestial mechanics] would have answered their purpose full as well as the glorious architecture which God had established in the heavens'.<sup>24</sup> This critique was echoed by Edward Hitchcock, who wrote that Laplace, 'though a giant in mathematics, was only a liliput on other subjects'. Laplace and D'Alembert, Hitchcock added, were not original thinkers like Newton and Boyle. For Hitchcock the latter showed their greater intellectual prowess, and more importantly their piety, by studying Christian theology as well as mathematics.<sup>25</sup>

Indeed, most Americans took Newton as their model for an astronomer because he had studied seriously Holy Scripture and had 'aimed at higher truths, and sought [God] in spiritual contemplation'.<sup>26</sup> By pointing to Newton, Hitchcock attempted to reassure his readers that astronomy was conducive to holy pursuits, and that men like Laplace and D'Alembert were

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<sup>24</sup>[Prof. Lewis], 'Study of the Heavens', *The Iris, or Literary Messenger*, 1 (1840-41), 127-35: 130.

<sup>25</sup>E. Hitchcock, *Religious Truth* (Boston, 1857), pp. 32-33. For other contemporary criticisms of Laplace, see McElligott, 'Before Darwin', pp. 55-6. William Whewell had made a similar distinction between inductivists like Laplace, whose narrow focus on mathematics led them to overlook evidence of God in nature, and deductivists like Newton, whose compass and genius he believed were far greater. See his *Astronomy and General Physics Considered with Reference to Natural Theology* (London, 1834), pp. 325-32.

<sup>26</sup>Lewis, 'Study of the Heavens', 134. David Brewster's *Life of Sir Isaac Newton* was quite popular in America. As volume 26 of Harper's Family Library, it was cheap and readily accessible.

'atheists in spite of science, rather than through its influence'. And by lauding the piety of the Protestant Newton and Boyle and contrasting it with the impiety of French materialists, he gave to Protestantism a more respectable provenance.<sup>27</sup>

For non-specialist Americans, then, popular astronomy as a pursuit was not an esoteric exercise in complex mathematics or in precision measurement but one that was charged with deep moral and spiritual meaning. They therefore tended to criticize the astronomy of emergent professionals for its spiritual vacuity. The new academic astronomy of William Cranch Bond, Benjamin Gould, and others was based on precision measurement done with highly specialized instruments housed in expensive observatories. Critics would have none of it. In his journal of 1839, Ralph Waldo Emerson wrote that whereas in the past an aurora borealis 'would have moved the awe and wonder of men' and inspired 'the profoundest sentiments of religion and love', we now 'all saw it with cold, arithmetical eyes....'<sup>28</sup> Walt Whitman's 'Learn'd Astronomer' exhibited a stifling rationality and was more enamoured with his charts than with the heavens.<sup>29</sup>

Together with Emerson's and Whitman's transcendentalist critique, other alternative cosmologies were being offered, or more accurately revived, in the 1830s in an attempt to undermine the bastions of academic astronomy then under construction. Leading the attack was the maverick naturalist Constantine S. Rafinesque and Charles Wetherill. In 1837 they republished Thomas Wright's

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<sup>27</sup>I owe this observation to Miriam R. Levin.

<sup>28</sup>Quoted in D.D. Hall, *Worlds of Wonder, Days of Judgment: Popular Religious Belief in early New England* (New York, 1989), frontispiece.

<sup>29</sup>J. Beaver, *Walt Whitman--Poet of Science* (Morningside Heights, New York, 1951), pp. 6-9, 131. As Beaver cautions, Whitman's poem should not be read as a diatribe against science but as a complaint against an overly dry and rational astronomy devoid of deeper, spiritual meaning. Whitman himself took a serious interest in astronomy and made accurate celestial observations.

(1711-86) poetic and speculative letters on astronomy.<sup>30</sup> In his polemical dedication to Wright's work, Wetherill declared that

no views of science except such as are founded on Newtonian degmas [sic] are allowed the protection of our great schools. And it is customary for such learned professors to brand with the names of strange views of science, all productions of intellect, not based upon their lauded author. But it is glaringly a fact, that society without the pale of the Colleges, is far, very far, in advance of the boasted knowledge of the schools...

For Wetherill, the wisdom of the common people led them to a deeper appreciation of astronomy's true meaning than the hidebound Newtonianism of college professors. A sound grasp on this true meaning was shown when people found their thoughts elevated by astronomy, when they came to recognize that all worlds were 'emanations of GOD', an insight which led them 'to charitable ACTS of benevolence'.<sup>31</sup>

Another alternative cosmology, in this case an original one, was provided by Edgar Allan Poe. In his *Eureka, A Prose Poem: Or the Physical and Metaphysical Universe* (1848), Poe drew heavily on the writings of Dick, John Pringle Nichol, and Alexander von Humboldt to develop a theory of the universe which both he and his reviewers took very seriously.<sup>32</sup> Professional astronomers like Benjamin Gould, however, demurred from embracing wholeheartedly such expositions. As Gould wrote privately, popular writings

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<sup>30</sup>On Wright's cosmology see M. Hoskin, 'The Cosmology of Thomas Wright of Durham', *Journal for the History of Astronomy*, 1 (1970), 44-52; S. Schaffer, 'Fire and Evolutionary Cosmology', *Journal for the History of Astronomy*, 9 (1978), 180-200.

<sup>31</sup>T. Wright, *The Universe and the Stars* (London, 1750); reprinted with notes by C.S. Rafinesque (Philadelphia, 1837), pp. 2-3.

<sup>32</sup>A. Cappi, 'Edgar Allan Poe's Physical Cosmology', *Quarterly Journal of the Royal Astronomical Society*, 35 (1994), 177-92. For an analysis of Poe's *Eureka* and Dick's influence on it see M. Altermann, *Origins of Poe's Critical Theory* (Iowa City, 1925), pp. 113, 116-20, 127, 138-41; and R.P. Benton, ed., *Poe as Literary Cosmologist: Studies on Eureka. A Symposium* (Hartford, 1975), pp. 4-15, 65. Dick also influenced Poe's 'The Conversation of Eiros and Charmion' (1839), reprinted in H. Beaver, ed., *The Science Fiction of Edgar Allan Poe* (Harmondsworth, 1976). I owe this last reference to John Heilbron.

on astronomy 'are exceedingly good in their proper place, but there ought to be something besides'.<sup>33</sup> But what was to be the 'something besides'? For Gould it was 'professionalism' as reflected in the pages of his *Astronomical Journal*, dedicated specifically to the advancement and not merely the diffusion of astronomical knowledge;<sup>34</sup> for Emerson, Wetherill and others it was a personal and deeply spiritual quest for meaning. In effect, Americans made rival claims as to what astronomy was and who had expertise in it.<sup>35</sup>

That dissenting readings of astronomy's cultural role and significance began appearing in the late 1830s and 1840s was no accident. By the 1840s science as practised by an emerging breed of 'scientists' had begun to diverge significantly from natural philosophy. This new breed 'began to care more for the approval and esteem of their disciplinary colleagues than they did for the general standards of success in the society which surrounded them'.<sup>36</sup> Knowledge which had been community-oriented and cultivated by unpaid devotees was being replaced by specialized disciplines placed on a national or even international footing by salaried practitioners and researchers.<sup>37</sup>

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<sup>33</sup>B. Gould to Elias Loomis, 27 Sep. 1849, 24 Sep. 1850, Elias Loomis MSS., Yale Univ., quoted in R.V. Bruce, *The Launching of American Science: 1846-1876* (New York, 1987), p. 244.

<sup>34</sup>G.H. Daniels, 'The Process of Professionalization in American Science: The Emergent Period, 1820-1860', *Isis*, 58 (1967), 151-66: 159. Daniels notes that Gould was one of the first to embrace the word 'scientist'. On American contributions to professional astronomy see S.G. Brush, 'Looking Up: The Rise of Astronomy in America', *American Studies*, 20 (1979), 2: 41-67; and N.S. Hetherington, 'Mid-19th-Century American Astronomy: Science in a Developing Nation', *Annals of Science*, 40 (1983), 61-80.

<sup>35</sup>These tensions emerged in the career of Cleveland Abbe as documented by N.S. Hetherington, 'Cleveland Abbe and a View of Science in Mid-Nineteenth-Century America', *Annals of Science*, 33 (1976), 31-49.

<sup>36</sup>C.E. Rosenberg, *No Other Gods: On Science and American Social Thought* (Baltimore, 1976), p. 14; G.H. Daniels, 'Process of Professionalization', esp. 154.

<sup>37</sup>T. Bender, 'Science and the Culture of American Communities: The Nineteenth Century', *History of Education Quarterly*, 16 (1976), 63-77, esp. 66; N. Reingold, 'Definitions and Speculations: The Professionalization of

Tensions between popular and more specialized forms of astronomy were made manifest by O.M. Mitchel's *Sidereal Messenger* (1846-48). With this periodical, Mitchel, then Director of the Cincinnati Observatory, sought to serve both specialists and a wider public.<sup>38</sup> He attracted fewer subscribers and less support from American astronomers than he had hoped, however, and after two years he gave up his experiment. Mitchel himself expressed his disappointment in 1846, complaining that 'How few are willing in our own day to pursue the science of the stars with equal perseverance [of the ancient astronomers]'. '[L]et any one who aspires to a knowledge of the heavens,' he advised, 'form his rude armillary sphere, divide his brazen circles with his own hands... [calculate his own lunar tables;] A few years will suffice to make him better acquainted with the heavens...'<sup>39</sup> Yet only select amateur astronomers--those who desired skills similar to those possessed by the new breed of full-time specialists--would have wanted to attain Mitchel's exacting standard.

Yet, however much they differed in defining astronomy or its cultural import, at least its supporters agreed that astronomy should be taught in America's schools and colleges. By the 1820s, geography had been established in many school curricula.<sup>40</sup> Recognizing this, supporters of astronomy argued that 'Our views of the earth must be very contracted, until we have

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Science in America in the Nineteenth Century', in A. Oleson and S.C. Brown, eds., *The Pursuit of Knowledge in the Early American Republic* (Baltimore, 1976), pp. 33-69.

<sup>38</sup>R. McCormach, 'Ormsby MacKnight Mitchel's *Sidereal Messenger*, 1846-1848', *Proceedings of the American Philosophical Society*, 110 (1966), 35-47.

<sup>39</sup>*Sidereal Messenger*, 2 (1847), 20.

<sup>40</sup>Harvard made geography a requirement for entrance in 1815; a few years later, Massachusetts made geography a part of the public school curriculum. See S.A. Bedini, *Thinkers and Tinkers: Early American Men of Science* (New York, 1975), pp. 378-79. On geography texts see C. Johnson, *Old-time Schools and School-Books* (New York, 1935), pp. 318-62.

some idea of its connexion with the solar system, and of the causes of those phenomena, which we daily witness'.<sup>41</sup> Interestingly, the title of what was probably the most widely circulated school textbook on astronomy in America was *Geography of the Heavens*. By extolling astronomy's practical benefits and by linking it to an established subject like geography, astronomy's supporters got their subject into public schools and colleges.

In their efforts to add the subject to the list of those taught in schools, astronomy's supporters tapped into and became part of a wider movement at work in America to encourage and improve education in the sciences. Typical of this movement was Frederick Hall, Principal of the Mount Hope Literary and Scientific Institution in Maryland. He lamented: 'That the sciences are too imperfectly taught;--too feebly patronized in our land, is a fact, well known, and, by many, deeply deplored'.<sup>42</sup> Reformers like Hall discovered they had a ready audience. By 1834, Americans had formed nearly three thousand Lyceums (voluntary educational associations intended chiefly for adults)<sup>43</sup> and they attended popular lectures in droves.<sup>44</sup> Americans exhibited a zest for self-improvement; as in Britain, members of an emergent and upwardly mobile middle-class sought to fulfil their cultural aspirations by acquiring the accomplishments which they believed cultured people

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<sup>41</sup>U.C. Burnap, *The Youth's Ethereal Director; or a concise and familiar explanation of the elements of astronomy* (Middlebury, Vermont, 1822), p. iii.

<sup>42</sup>F. Hall, *An Oration, on the Importance of Cultivating the Sciences* (1828), pp. 7-8.

<sup>43</sup>Statistic quoted in G.H. Daniels, *Science in American Society: A Social History* (New York, 1971), p. 160. On lyceums see L.G. Stambler, 'The Lyceum Movement in American Education, 1826-1845', *Paedagogica Historica*, 21 (1981), 157-85. This article concludes with a brief bibliography, 184-85.

<sup>44</sup>D.M. Scott, 'The Popular Lecture and the Creation of a Public in Mid-Nineteenth-Century America', *Journal of American History*, 66 (1980), 791-809.

possessed.<sup>45</sup> Taking full advantage of these aspirations, American colleges began to encourage science, hoping thereby to attract more students while serving simultaneously the practical and moral needs of the republic.<sup>46</sup>

## 8.2 Thomas Dick and the Religious Character of Popular Astronomy in America

Dick's works on astronomy 'enjoyed a degree of popularity ... almost unexampled in the history of scientific literature. The sale of the editions republished in this country was unbounded, until nearly the whole of his successive volumes found a place in every private and public library in the land'.

W.N. Griggs, *The Celebrated 'Moon Story'* (New York, 1852), p. 8.

By acquiring knowledge, many Americans, particularly members of an emergent middle-class, hoped for greater financial success and higher social status. These hopes were considered to be perfectly respectable as long as one used one's money and position for higher purposes. It is worth repeating that the moral and religious implications of knowledge (not strictly separable since morality was defined in Christian terms, even by non-Christians) were of paramount importance to most Americans. In the climate of the Second Great Awakening and of deeply serious Christian purpose, astronomy, whose utilitarian benefits were rather restricted to begin with, saw its moral and religious benefits loom all the larger. In this milieu, Dick's works, as one obituary put it, were 'circulated most extensively, consoling, teaching, and elevating the minds of millions.... His name was even as a household word

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<sup>45</sup>J.D. Watkinson, 'Useful Knowledge? Concepts, Values and Access in American Education, 1776-1840', *History of Education Quarterly*, 30 (1990), 351-70. Watkinson notes that attorneys and physicians tended to dominate learned societies in New York and Massachusetts, prompting complaints from those like Timothy Claxton who saw knowledge as the key to social mobility for the lower classes (352-53).

<sup>46</sup>S.M. Guralnick, *Science and the Ante-bellum American College* (Philadelphia, 1975), p. viii and ch. 5, pp. 78-93 on astronomy.



among hosts of serious-minded, thoughtful, religious people'.<sup>47</sup>

As demonstrated in chapter seven, overwhelming evidence exists to confirm that Dick's name was indeed a household word in antebellum America, especially when linked to popular astronomy. It is more than likely that Dick's *Celestial Scenery* (1837) and *Sidereal Heavens* (1840) were the most widely read popularizations of astronomy in antebellum America. They were both included in Harper's popular and inexpensive 'Family Library' and 'School District Library' series. Moreover, several popular science texts borrowed extensively from them. In Samuel Goodrich's *A Glance at the Physical Sciences*, the chapter on astronomy was almost completely extracted from these two books. As volume thirteen of Parley's 'Cabinet Library' for schools and families, Goodrich's book, if the 'Advertisement' accompanying it can be believed, was 'adopted into many of the libraries of the leading schools and seminaries in New England and New York... [and] into more than three thousand families, in Boston, New York, and Philadelphia'.<sup>48</sup> A British author, Thomas Milner, compiled a chapter on the wonders of the heavens for his *Gallery of Nature* from Dick's *Celestial Scenery* and *Sidereal Heavens*. Eighty-five Boston clergymen subscribed to Milner's book, and Louis Agassiz, Denison Olmsted and Benjamin Silliman wrote testimonials to it.<sup>49</sup> Considering his criticism of Dick, it was somewhat ironic that Olmsted extracted from *Celestial Scenery* lengthy passages on the moon's surface, on prospects for seeing life on the moon with improved instruments, and on Saturn's and

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<sup>47</sup> 'Thomas Dick and Eugene Sue', *Philadelphia Press*, 1 (19 Aug. 1857), no. 16, p. 1, c. 3.

<sup>48</sup> S.G. Goodrich, *A Glance at the Physical Sciences; or the Wonders of Nature* (Boston, 1849), pp. 9-70, 357.

<sup>49</sup> T. Milner, *The Gallery of Nature; or Wonders of the Earth and the Heavens* 2 vol. (Boston, 1857), ch. 25, 'Wonders of the Heavens', pp. 789-824.

Uranus's beauty, which he used in his *Letters on Astronomy*.<sup>50</sup>

By penning a lengthy introduction to Elijah Burritt's *The Geography of the Heavens, and Class Book of Astronomy* (1833), which became almost certainly the most popular class-book for teaching astronomy in America,<sup>51</sup> Dick became even more indelibly etched in the minds of Americans as a popularizer of astronomy par excellence. Indeed, the publisher's notice to this work crowed that

Dr. Dick of Scotland, so well known both in Europe and in this country... has prepared... an *Introduction on the Advantages of the Study of Astronomy*. So far as authority and name can go to give currency to the work, and to establish the confidence of teachers in it as a proper text book, this simple fact, the publisher flatters himself, furnishes every testimonial which can be desired.<sup>52</sup>

Astronomy's uses were of course manifold and aptly summarized by Dick in his introduction to Burritt's text:

It lies at the foundation of our geographical knowledge--it serves as a handmaid to the purposes of universal commerce--it determines the seasons, and directs the operations of the husbandman--it supplies us with an equable standard of time, and settles the events of history--it lends its aid to the propagation of religion, and undermines the foundation of superstition and astrology. Above all, it illustrates the glory of the perfections of the Deity--displays the extent and grandeur of his universal empire--affords subjects of sublime contemplation, enlarges the conceptions, and invigorates the mental powers--counteracts the influence of pride, and promotes the exercise of humility--prepares the soul for the employments of the future world--and demonstrates, that the Creator has it in his power to open up endlessly diversified sources of happiness to every order of his intelligent offspring, throughout all

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<sup>50</sup>D. Olmsted, *Letters on Astronomy, Addressed to a Lady* (Boston, 1841), pp. 163-66, 171-2, 283, 286. Yet another book which borrowed from Dick was Duncan Bradford's *The Wonders of the Heavens, being a Popular View of Astronomy* (Boston, 1837).

<sup>51</sup>It went through at least eight editions and thirty-three printings by 1876, according to D.J. Warner, 'Astronomy in Antebellum America', 58.

<sup>52</sup>Dick also penned at least two original articles on astronomy for American periodicals: 'An Idea of the Universe', *Littell's Museum of Foreign Literature*, 38 (Feb. 1840), 193-99; reprinted in *The Literary Emporium*, 1 (Feb. 1845), 44-52; and 'The Rings of Saturn', *Knickerbocker Magazine*, 11 (Feb. 1838), 89-96; reprinted in *The New Yorker*, 4 (Feb. 1838), 738-40.

the revolutions of eternity.<sup>53</sup>

It was this last, eighty-six-word sentence, outlining the moral and religious benefits of astronomy, which was obviously the crucial one for Dick. The religiosity of this passage was typical of all of Dick's writings on astronomy. That his writings proved immensely popular in America tells us that here moral and religious motives to study the heavens were paramount.

As one anonymous reviewer of Burritt's text wrote:

[Astronomy is] a subject too much neglected. How few, even of our graduates, are familiar with the heavens; and yet, without this knowledge, it is impossible to understand or trace the most magnificent display of Divine power which is presented to the eye of man--the movements of the heavenly bodies.<sup>54</sup>

With their emphasis on moral and religious utility, Dick's works helped to set the tone for the great majority of popular works on astronomy in America. Astronomy demonstrates 'the Existence, the Eternity, the Ubiquity, the Omniscience and the Omnipotence of One JEHOVAH!', one writer enthused, and it serves 'to strengthen our faith in those more sublime and more important truths communicated to us by Revelation....'<sup>55</sup> Most authors echoed such sentiments: astronomy, another writer claimed, 'seems peculiarly calculated to elevate the human mind, and enlarge our apprehensions of the power and wisdom of the CREATOR'. Students were even told explicitly how knowledge of astronomy should affect their minds:

It should beget devout emotions and affections toward the great Author

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<sup>53</sup>For a lengthier but essentially similar summary of astronomy's utility see E. Everett, *The Uses of Astronomy. A Discourse delivered at Albany on the 28th of August, 1856, on Occasion of the Inauguration of the Dudley Observatory*, reprinted in *American Journal of Education*, 2 (1856), 605-28.

<sup>54</sup>'Review of Burritt's "Geography of the Heavens"', *American Annals of Education and Instruction*, 3 (Apr. 1833), 191-2.

<sup>55</sup>D. Young, *Lectures on the Science of Astronomy, Explanatory and Demonstrative* (Morris-Town, New Jersey, 1821), p. 13. Young identified these 'truths' as 'the immortality of the human soul, the apostasy of man from God, and the benevolence and compassion of the Infinite Sovereign, as displayed in the Redemption of the world through JESUS CHRIST'.

of our being;--an humble confidence in his protecting Providence, and a full conviction of our own comparative weakness. It... should lead us to cherish an active desire to know him, and to do his will.<sup>56</sup>

Given this belief that astronomy complemented and effectively ended in Christianity, it was no surprise that several popular astronomy texts were written by ministers. Their participation probably served further to persuade people of astronomy's moral trustworthiness and holiness. Interestingly, ministers especially stressed astronomy's trustworthiness in the education of youth. One wrote that it 'suited to excite, and gratify the curiosity of the young--to turn away their eyes from beholding vanity--to extinguish their unhallowed desires, and thus to prevent them from disturbing others, and destroying themselves'.<sup>57</sup> This seems a lot to ask from astronomy, but it reflected the high moral regard in which it was held. John L. Blake, an Episcopalian minister whose edition of Jane Marcet's *Conversations on Chemistry* (1826) proved popular, agreed that no subject was 'better calculated' than astronomy 'to gain the attention of children; and to raise in the mind a highly improved state of moral sentiment, and moral feeling'. In one copy of Blake's *Astronomy*, a young woman pencilled in the sentiment, 'That a person can pursue the study of Astronomy and not have exalted notions of the Creator is an idea not to be believed, By me at least'.<sup>58</sup> Similar references as to how astronomy elevated the mind and turned it towards contemplating God's goodness, wisdom and power could be multiplied almost without end.

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<sup>56</sup>Anon., *The Juvenile Philosopher; or Youth's Manual of Philosophy*, 2nd rev. ed. (Geneva, New York, 1826); M.R. Bartlett, *Young Ladies' Astronomy* (Utica, New York, 1825), p. 4.

<sup>57</sup>Rev. A. Pettengill, *A View of the Heavens, or Familiar Lessons on Astronomy* (New Haven, 1826), p. 5.

<sup>58</sup>J.L. Blake, *First Book in Astronomy* (Boston, 1831), p. iv (the pencilled passage was dated 26 Nov. 1842). Book deposited at the American Antiquarian Society, Worcester, Massachusetts.

Such appeals to the moral utility of science and arguments from design come as little surprise since William Paley's works, and those of Dick for that matter, were ubiquitous in America's homes, schools and colleges.<sup>59</sup> Yet Dick and other proponents of astronomy went further and claimed that astronomy was the most sublime science. By the 1830s, 'sublime' as a term had been 'largely transformed from an esthetic to a Christianized mark of the deity resident in nature'.<sup>60</sup> By claiming, then, that astronomy was the most sublime science, authors meant that it was the science which most clearly revealed God's presence in nature. Edward Young's maxim that 'An undevout Astronomer is mad' was so often quoted that it became a truism for most Americans.

Helping Christians to express their devotion to God was something for which astronomy's proponents saw their science as particularly well suited. Denison Olmsted professed that

I do not pretend that this, or any other science, is adequate of itself to purify the heart, or to raise it to its Maker; but I fully believe that, when the heart is already under the power of religion, there is something in the frequent and habitual contemplation of the heavenly bodies under all the lights of modern astronomy, very favorable to devotional feelings, inspiring, as it does, humility, in unison with an exalted sentiment of grateful adoration.<sup>61</sup>

Olmsted, concludes Gary Schoepflin, saw his efforts in science as 'predominately an exercise in worship' guided by his own personal faith and vision of Christianity.<sup>62</sup>

In his religiosity, Olmsted by no means stood apart from his fellow

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<sup>59</sup>W. Glick, 'Bishop Paley in America', *The New England Quarterly*, 27 (1954), 347-54; W. Smith, 'William Paley's Theological Utilitarianism in America', *William and Mary Quarterly*, 11 (1954), 402-24: 418-20.

<sup>60</sup>B. Novak, *Nature and Culture: American Landscape and Painting 1825-1875* (New York, 1980), p. 7.

<sup>61</sup>D. Olmsted, *Letters on Astronomy*, pp. 413-14.

<sup>62</sup>G. Schoepflin, 'Denison Olmsted', p. 34.

professionals. About Albert Hopkins, founder of the observatory at Williams College in 1838, it was claimed that 'There was no one who did more to interest his students in all the Creator's wonderful works'.<sup>63</sup> Benjamin Peirce, Professor of Astronomy and Mathematics at Harvard, was known to stop abruptly during his lectures on celestial mechanics to declare:

Gentlemen, as we study the universe we see everywhere the most tremendous manifestations of force. In our own experience we know but one source of force, namely will. How then can we help regarding the forces we see in nature as due to the will of some omnipresent, omnipotent being. Gentlemen, there must be a GOD.<sup>64</sup>

Raised in a devout Presbyterian family, O.M. Mitchel was also impassioned by religion, studying nature to fathom God's plan.<sup>65</sup> Pursued in the proper spirit, Mitchel suggested,

Astronomy lifts us to companionship with angels and arch-angels, and becomes the precursor of that sublime career of study of the undying spirit, when God the Father shall have stript it of earth's muddy vesture, and shall have arrayed it in garments of immortal light and beauty.<sup>66</sup>

To be sure, such inspirational statements could be relied upon to win applause during lectures. But both the sentiments and the applause were not false but rather unquestionably sincere.

The sincerity of such godly rhetoric is corroborated in Charles Rosenberg's study of agricultural chemists in antebellum America. Rosenberg

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<sup>63</sup>T.H. Safford, *The Development of Astronomy in the United States*. A Discourse read June 25, 1888 to commemorate the fiftieth anniversary of the dedication of the Hopkins Observatory of Williams College (Williamstown, Mass., 1888), p. 16.

<sup>64</sup>W.E. Byerly, 'Reminiscences', in R.C. Archibald, ed., *Benjamin Peirce, 1809-1880* (Oberlin, 1925), pp. 5-6, quoted in M. Rothenberg, 'Patronage of Harvard College Observatory, 1839-1851', *Journal for the History of Astronomy*, 21 (1990), 37-46: 44.

<sup>65</sup>P.S. Shoemaker, 'Stellar Impact: Ormsby Macknight Mitchel and Astronomy in Antebellum America' (Univ. of Wisconsin-Madison Ph.D. thesis 1991), pp. 189-203.

<sup>66</sup>O.M. Mitchel, *An Address delivered at the dedication of the Astronomical Observatory of Hamilton College, July 16, 1856* (Utica, New York, 1856), p. 31.

concluded that these chemists 'all adhered to a peculiarly evangelical and intensely pietistic faith' which, in its intensity, verged on moral heroism. Believing that human history was progressive and that humans could work towards the millennium, these men sought to improve society through science.<sup>67</sup> A similar faith in the moral and religious efficacy of science can be seen in the development of popular microscopy in antebellum America.<sup>68</sup>

Here George Daniels's claim that this 'vogue of natural theology' was a case of 'scientists trying to attach some of the aura of the theologian to their own profession' seems reductionist in the extreme. While accepting that most scientists were sincere in their piety, Daniels argued that it was their 'changing social position', and not their deep-seated piety or heartfelt Christian faith, which led them to issue godly statements. Pious rhetoric, Daniels suggested, was an expedient ploy by which scientists sought to avoid conflict with theologians while maintaining a dialogue with educated nonspecialists.<sup>69</sup> Such an account fails to credit properly the religiosity of astronomers like Olmsted, Peirce and Mitchel, or of geologists like Hitchcock, James Dwight Dana and Benjamin Silliman.<sup>70</sup> In antebellum

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<sup>67</sup>C.E. Rosenberg, *No Other Gods*, pp. 3, 136-40.

<sup>68</sup>J.H. Warner, "'Exploring the Inner Labyrinths of Creation": Popular Microscopy in Nineteenth-Century America', *Journal of the History of Medicine and Allied Sciences*, 37 (1982), 7-33: 22-4. See also McElligot, 'Before Darwin', ch.3, sect.3, 'The Reconciliation of Religion and Science', pp. 139-78.

<sup>69</sup>G.H. Daniels, 'Professionalization in American Science', 163.

<sup>70</sup>See J.C. Greene, 'Protestantism, Science, and American Enterprise: Benjamin Silliman's Universe', in L.G. Wilson, ed., *Benjamin Silliman and his Circle* (New York, 1979), pp. 11-27. Greene shows that Silliman, Hitchcock and Dana saw science as a gift from God, and notes (on p. 22) that moral and religious reflections were an essential component of Silliman's popular lectures. Also see S.M. Guralnick, 'Geology and Religion before Darwin: The Case of Edward Hitchcock, Theologian and Geologist (1793-1864)', *Isis*, 63 (1972), 529-43; P.J. Lawrence, 'Edward Hitchcock: The Christian Geologist', *Proceedings of the American Philosophical Society*, 116 (1972), 21-34.

American culture, it was not the rather halting emergence of professional disciplines which moulded personal attitudes towards, and public statements about, science. Rather, it was the vastly more powerful cultural force of evangelicalism which informed the attitudes and choices of both specialists and non-specialists in science.

Here I differ from Sally Kohlstedt's claim that, by the 1840s in America, 'Science taught in conjunction with moral values... seemed inappropriate, even embarrassing'.<sup>71</sup> Even for the 'professional scientists' then emerging, this is dubious. Mitchel and Olmsted strenuously objected to any uncoupling of science from moral or religious concerns, as did Hitchcock and Dana. In their religiosity, these specialists reflected and reinforced the culture of their day. Among amateurs or devotees the moral and religious motive was usually, if not always, manifested in even clearer terms. When non-specialist Americans pursued science, they did so not merely for pleasure but for self-improvement, which they measured in moral rather than economic terms. For many, to be inspired to worship God more perfectly was the goal.

In this context, devotional utterances which to late twentieth-century readers seem overblown and self-indulgent in their religiosity were commended by mid-nineteenth-century readers when adjudged spontaneous and truly heartfelt. Thus one reviewer rhapsodized that Dick's *Celestial Scenery* was

a work of uncommon interest. The subjects, so vast, so grand, so incomprehensible, appeal to the loftiest attributes of our nature, to the faculties of reason and imagination, and to the feelings of hope and reverence... [W]e think [it] replete with sublimity and beauty; not in language merely, but in ideas, which seem to grasp an earnest of the soul's immortality.<sup>72</sup>

In America, moreover, Dick was not alone in believing that the study of astronomy was the best preparation for humanity's future explorations of God's

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<sup>71</sup>S.G. Kohlstedt, 'Parlors, Primers, and Public Schooling', 444.

<sup>72</sup>Anon., 'Review of *Celestial Scenery*', *Godey's Lady's Book*, 16 (1838), 285-86.



universe in the afterlife. Rafinesque did too. As already noted, Rafinesque greatly admired Thomas Wright's letters on astronomy. Wright's religion of the celestial spheres, Rafinesque boldly asserted, is 'the Religion of GOD and his ANGELS, instead of our paltry contending terrestrial Sects'. Wright's writings were superior even to Fontenelle's because 'they dive deeper into infinite space and lead us nearer to the threshold of the central throne of GOD'.<sup>73</sup> Like Dick, Rafinesque believed that astronomy was a 'Divine Science' which was advancing humanity's knowledge of 'the congregation of the Heavens'. In fact he praised Dick as being 'one of the earnest Apostles of knowledge and truth'.<sup>74</sup> If Dick and Rafinesque were in any way eccentric, it was only in the degree to which they connected their astro-theological speculations to specific conceptions of heaven.<sup>75</sup>

A strong and near universal belief in the plurality of worlds provides further evidence of the importance which Americans assigned to the religious implications of astronomy. As shown in chapter four, belief in the plurality of worlds was underpinned by teleology, analogy, the concept of plenitude, and a desire to magnify God's glory. It had been made immune to Thomas Paine's scepticism by Timothy Dwight's sermons at Yale,<sup>76</sup> published as his *Theology Explained and Defended*, and Chalmers's *Astronomical Discourses*. In fact no popular text on astronomy which I examined denied the plurality of worlds, and

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<sup>73</sup>T. Wright, *Universe and the Stars*, with notes by C. Rafinesque (Philadelphia, 1837), pp. 6-7, 155.

<sup>74</sup>C.S. Rafinesque, *Celestial Wonders, and Philosophy* (Philadelphia, 1838), pp. 10, 16, 114.

<sup>75</sup>America in the 1840s also witnessed a resurgence of interest in Emanuel Swedenborg's ideas. Perhaps the response of the Philadelphia Quaker City, 16 Mar. 1850, p. 2, c. 2, was typical here: 'Called a Dreamer by some, and revered as the Messiah of a new covenant by others, Swedenborg was certainly a man of great power. Whether his revelations are true or false, they make you think'.

<sup>76</sup>Dwight (1752-1817) was President of Yale from 1795 to 1817.

nearly all contained passages strongly in favour of it. A typical passage from a popular periodical asserted:

How can we withhold our assent to this honorable, this benevolent, this soul-ennobling doctrine? How can we so far pervert our intellects as to deny its correctness, and say this contemptible world... contains all the intelligence, all the wisdom, all the mind of the great Solar system? It would be a slander on nature, a libel on Providence; and it would likewise be the infallible index of a weak, a childish intellect.<sup>77</sup>

Plurality was felt to be inspirational for all, as revealed by M.R. Bartlett's *Young Ladies' Astronomy* (1825). Plurality, Bartlett declared, 'cherishes such exalted conceptions of the Almighty Architect, such a happy frame of spirit, and such devout and sublime emotions of soul, that were the whole a mere delusion, it were a pity to detect the fallacy'. Rejecting plurality, in contrast, led to impoverished conceptions of God's character, even stripping Him of 'some of those exalted attributes assigned him by the unlettered savage'. When William Whewell's *Plurality of Worlds* (1854), which suggested humans might be alone in the universe, was published in America, Edward Hitchcock wrote an introduction to it in which he directly contradicted Whewell. Hitchcock asserted that '[W]e cannot admit that man is the only exalted created being to be found among the vast array of worlds around us', for 'such a view gives us a very narrow idea of the plans and purposes of Jehovah, and one not sustained in our opinion by the analogies of science'.<sup>78</sup>

A belief in the plurality of worlds was crucially important to the early Mormon church, and thus it comes as little surprise that prominent Mormons cited and commended Dick's writings. Indeed, Fawn Brodie went so far as to

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<sup>77</sup>Anon., 'Probability of the Planets being Inhabited', *Atkinson's Casket*, 8 (Aug. 1832), 338-40.

<sup>78</sup>M.R. Bartlett, *Young Ladies' Astronomy*, pp. 4-7; E. Hitchcock, 'Introductory Notice' to W. Whewell's *Plurality of Worlds* (Boston, 1854), pp. xiii-xvi.

assert that Joseph Smith owed many of his ideas to Dick's *Future State*. Although her claim has largely been refuted, it is clear that Mormons found Dick's writings congenial to their faith, printing and praising excerpts from his *Philosophy of Religion and Future State* in the *Mormon Messenger and Advocate* in 1836 and 1837.<sup>79</sup>

Although Mormons were enthused by Dick's writings on pluralism, not all Americans considered his confident statements to be useful or even permissible. Some saw Dick as a misguided prophet who preached to a credulous crowd. One critic, R.A. Locke, perpetrated what became known, somewhat misleadingly, as the 'Moon hoax' of 1835 in an attempt to discredit breathless supporters of pluralism like Dick. Locke deliberately spread false reports (printed in the *New York Sun*) that John Herschel had seen through his telescope birds, animals, and even 'Lunarians' living on the Moon. Dick was horrified. He warned the 'young man' that he risked being classed with 'liars and deceivers' and that his 'hoax' had been 'injurious to the interests of science' because it led 'untutored minds' to suspect science's authority.<sup>80</sup> This last point is crucial: for Dick, science was a way to truth, a way to overcome the superstitions of the ignorant, a way to know God. By revealing the shakiness of science's foundation as a norm for truth, Locke's satire shook Dick's philosophy to the core.

In his account of Locke's satire, written seventeen years later in 1852, W.N. Griggs suggested that Dick's 'religio-scientific rhapsodies' had been Locke's chief target and inspiration. Griggs's account is plagued by

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<sup>79</sup>F.M. Brodie, *No Man Knows My History: The Life of Joseph Smith, the Mormon Prophet* (New York, 1945), pp. 171-72. Refuting her claim is E.T. Jones, 'The Theology of Thomas Dick and its Possible Relationship to that of Joseph Smith' (Brigham Young Univ. M.A. thesis 1969), esp. pp. 77-96; and E.R. Paul, *Science, Religion, and Mormon Cosmology* (Chicago, 1992). Paul concludes that 'it seems highly unlikely that Joseph Smith benefited significantly from Dick's ideas' (pp. 82, 89-92).

<sup>80</sup>Dick, *Celestial Scenery*, pp. 245-46.

inconsistencies, however. It is equally plausible that he imputed to Locke his own considerable distaste for Dick's 'pseudo-scientific' writings.<sup>81</sup> Deploring the fact that Dick's writings enjoyed a popularity in England and America which was 'almost unexampled in the history of scientific literature', Griggs wrote that

it would be difficult to name a writer who, with sincere piety, much information, and the best intentions, has done greater injury, at once, to the cause of rational religion and inductive science, by the fanatical, fanciful, and illegitimate manner in which he has attempted to force each into the service of the other, instead of leaving both to the natural freedom and harmony of their respective spheres.<sup>82</sup>

Griggs, it is clear, saw Dick as a misguided enthusiast who, by entangling science with religion, was essentially strangling the healthy and separate growth of both. Yet preventing the separation of science and religion into 'their respective spheres' was the very hallmark of Dick's philosophy, a hallmark he shared with his fellow evangelicals, as the next section will show.

### 8.3 Evangelical Responses to Popular Astronomy

Treating 'evangelical' responses to astronomy is useful for two important reasons. First, evangelicalism formed the 'cultural core' in the antebellum

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<sup>81</sup>Michael Crowe supplies the best discussion of Locke's 'hoax' and notes the inconsistencies in Griggs's account. Crowe holds that Locke was inspired to write his satire probably by reading Dick's *Future State* and two appendices in his *Christian Philosopher*. However, given the well-nigh universal professions of belief in pluralism in American popular astronomy books, periodicals, and lectures, it seems equally plausible that Locke was not inspired by, or specifically targeting, Dick's writings. Locke's satire and Griggs's complaints, it would appear, had little if any negative impact on the enormous popularity of pluralism and Dick's works at this time. See M. Crowe, *Extraterrestrial Life Debate*, pp. 214-15 and esp. p. 592, fn 160.

<sup>82</sup>W.N. Griggs, *The Celebrated 'Moon Story', Its Origins and Incidents; with a Memoir of the Author* (New York, 1852), pp. 8-9.

North.<sup>83</sup> Second, with their cultural dominance, evangelicals demonstrated a high degree of confidence in appropriating resources which in less certain times they may have shunned. In subordinating and integrating astronomy into their religious lives, mainly to teach moral and religious lessons and to enhance their devotions, they exhibited theological sensitivities and goals which are distinguishable as 'evangelical'.

It is best to begin by considering American evangelicals first as an audience for science, then for astronomy. In a sermon given during the American Association for the Advancement of Science meeting in Albany in 1856, Mark Hopkins, President of Williams College, preached that

[Science's] sphere...is limited. Even in Astronomy... she knows only recurring movements... She knows... nothing of love, and worship, and of a comprehensive wisdom, though she may minister to them. These, the great leaders in science, its discoverers and pioneers, have retained.... But men of the second rank have often cultivated science at the expense of their humanity. It is not that they have been too scientific, but exclusively or falsely so.<sup>84</sup>

Hopkins's speech typified evangelicals' cautious embrace of science. They did not oppose science. Rather, they opposed those 'second rank' figures who, in elucidating the divine plan, relied overmuch on human reason and who failed therefore to revere equally both holy books of Nature and Scripture.

Evangelicals did in fact take considerable pride in expressing their openmindedness towards science and of contrasting it with the obscurantism

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<sup>83</sup> See especially D.W. Howe, 'Religion and Politics in the Antebellum North', in M.A. Noll, ed., *Religion and American Politics: From the Colonial Period to the 1980s* (Oxford, 1990), pp. 121-45; 132-35; and J. Turner, *Without God, Without Creed: The Origins of Unbelief in America* (Baltimore, 1985), pp. 73-113. Turner argues that 'Evangelicalism was the mainstream' of antebellum American culture (p. 79).

<sup>84</sup> M. Hopkins, *Science and Religion. A Sermon delivered in the Second Presbyterian Church, Albany, on Sabbath Afternoon, August 24, 1856* (Albany, 1856).

which they attributed to Catholics.<sup>85</sup> 'Popery, of course, does not like light, whether it comes from the mines of geology, or the observatory of the astronomer... or from the word of God...', claimed the London Presbyterian minister John Cumming in a pamphlet republished in New York. And Archbishop Cullen of Ireland was still denying the Copernican system, Cumming was pleased to add.<sup>86</sup> That Catholics opposed science was for Cumming a sign of a Church and a Faith in irreversible decline.

In a similar tenor, the Methodist minister W.F. Lowrie argued that the history of astronomy revealed that Catholic prelates had exploited fears about comets to frighten people into filling the coffers of the Church. By sponsoring the dissemination of knowledge, however, Protestants had made it far more difficult, Lowrie suggested, for such 'designing and crafty men' to exploit 'the excessive ignorance and credulity of the people'.<sup>87</sup> By counting themselves among the enlightened supporters of science, evangelicals reinforced their self-image as unprejudiced truth-seekers, correctors of the crimes of obscurantist, rapacious Catholics.<sup>88</sup>

To be sure, resurrecting Galileo to remind readers of the foolishness, foulness and futility of Catholic opposition to science was a favourite tactic of Protestant apologetics. 'When unlettered cardinals condemned the Father of Astronomy to torture and a prison', one author wrote, 'we can easily

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<sup>85</sup>On American Catholic attitudes towards science, see my forthcoming article, 'Gentle Skeptics? American Catholic Encounters with Polygenism, Geology and Evolutionary Theories from 1845 to 1875', *Catholic Historical Review*, January 1996.

<sup>86</sup>God in Science. A Lecture by Rev. John Cumming, D.D., delivered before the Young Men's Christian Association, in Exeter Hall, Jan. 7, 1851 (New York, 1852), pp. 134-37.

<sup>87</sup>Lowrie, 'Deity and Nature', *Ladies' Repository*, 1 (1841), 268-72: 269.

<sup>88</sup>Opposition to Catholicism was an important aspect of evangelicals' self-identity. See J. Wolffe, 'Anti-Catholicism and Evangelical Identity in Britain and the United States, 1830-1860', in M.A. Noll, et al., eds., *Evangelicalism* (Oxford, 1994), pp. 179-197.

imagine, that priestcraft would eagerly grasp at every instrument, artificial or natural, to strengthen its power, and perpetuate its tyranny'.<sup>89</sup> Protestants, in contrast, were advised to show manly confidence in their creed by avoiding displays of 'nervous timidity' upon encountering fresh discoveries in science. 'Do Protestant Christians dread the diffusion of knowledge?', one author boldly asked.<sup>90</sup> Faced with a rapidly growing Catholic church with a distinctly foreign cast, science became a cudgel with which Protestants could beat Catholics. In their attempts to maintain and enlarge their cultural dominance in antebellum America, it was evangelicals who wielded this cudgel with the greatest vigour.

Evangelicals not only used science to cow Catholics: they also used it to make proud souls cower. Indeed, the extent to which they used lessons from astronomy to show humans how puny and insignificant they were in God's universe was remarkable. Humans, one author declared, were stars of no magnitude who vanished from view 'in the presence of the glory of the Son of righteousness'. Yet, wonder of wonders, God not only continued to see but also to care for His chosen people. Lessons in humility like this reinforced a distinctly evangelical emphasis on humanity's total dependence on God.

Invaluable for encouraging proper displays of humility and thankfulness in God's presence, astronomy may also have been a way for evangelicals to revive, in a less intense way, the ecstasy which they had experienced during their conversions. In evangelicalism, a 'religion of the heart', contemplating the wonders of God's heavens with mouth agape and soul stirred was felt to be both fitting and proper. In reading Dick's works on astronomy one cannot help but be struck by the sheer number of times that he is moved

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<sup>89</sup> 'Comets and Eclipses', *Knickerbocker*, 7 (Mar. 1836), 262-65: 264.

<sup>90</sup> H., 'Warfare of Misguided Zeal upon Science', *Knickerbocker*, 8 (1836), 666-74: 668, 674, *emph. in orig.*

by his contemplations of the heavens to praise and glorify God.

Evangelicals, then, demonstrated considerable skill in adopting themes and material from astronomy and employing them for their purposes. In their hands, almanacs, besides supplying the usual monthly calendars, also gave accounts of the operations of benevolent institutions and of Bible and missionary societies as well as 'an abstract of the operations of the Spirit of God in the revival of religion'.<sup>91</sup> Astronomy further provided a rich storehouse of metaphors and analogies, with Timothy Dwight equating the Sun with God, the Moon with Christ, and writing that the Moon

returns, and communicates to mankind, the light of the Sun in a gentle and delightful manner, exactly suited to the strength of the human eye: an illustrious and most beautiful emblem... of the divine REDEEMER of mankind; who, softening the splendour of the Godhead, brings it to the eye of the understanding, in a manner fitted to the strength of the mind; so that without being overwhelmed, or distressed, it can thus behold the light of the knowledge of the glory of God in the face of Jesus Christ.<sup>92</sup>

And, in a fascinating passage, the triumph of Copernicanism over geocentrism could also be co-opted by Calvinist evangelicals in their struggle against Arminians:

Certain appearances strongly favored the old doctrine, that the sun, moon, and stars traveled, in marshaled hosts, around our insignificant orb, just as in the Arminian system, certain appearances may seem to indicate that man is the center of the system, and that God, and all the hosts of heaven, live and act chiefly to minister to his comfort. But it is now clear, that all the proper facts in astronomy go to prove, that the earth is a small part of the plan, and to confirm the system of Copernicus. So we affirm that the Calvinistic scheme--despite all Arminian appearances, is the plan on which this world is actually governed; and that all the objections that have been urged against it are urged against facts that are fixed in the very nature of things.<sup>93</sup>

This appropriation of astronomy's authority to assert the impossibility of

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<sup>91</sup>[Astro-Theologus], *The Evangelical Almanack: or, Religious Monitor* (Albany, 1822-26), 1822, p. 4; 1826, p. 26.

<sup>92</sup>T. Dwight, *Theology Explained and Defended*. 2 vols. (New Haven, Conn., 1836), I, 283 (sermon xvii).

<sup>93</sup>*Quarterly Christian Spectator*, new series, 2 (1830), 696, 701; 3 (1831), 88-89.



Arminianism when considered with respect to the known physical laws of the universe was, as far as I know, unique.

Turning to children's literature, evangelicals used the simplest of astronomical observations for devotional purposes. One book advised children to 'Learn to love the morning-star... as one of the most beautiful objects in nature. But love to gaze upon it chiefly because it is recognized by God himself as an emblem of Him who is now shining as the Morning-Star of the moral and spiritual world'. Children were to study nature not for nature's sake but to gain 'deeper feelings of dependence on God, and [a sense of] gratitude towards him'. And children were chastened by reminders that because of original sin, 'God now speaks to us... every where in his works, in mingled tones of goodness and of wrath'.<sup>94</sup> The moral soundness of discourses on nature was exhibited in this book when the most thoughtful and sensitive of the three children addressed became a minister in adulthood.

In fact religious instruction of evangelical children began almost in the cradle. In this process, evangelicals considered references to the heavens morally edifying for children as young as four. Pre-schoolchildren were told that the sun was put in the sky and held there by God, and that 'When we look at the moon and stars, let us think "how great God is"'.<sup>95</sup> In another infant reader, an older brother asked his younger brother how the sun got up in the sky; the younger brother replied 'God put him there...', which led his older brother to remind him that 'If you want to get up to heaven, you must ask God to help you for Jesus Christ's sake. That is the

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<sup>94</sup>Edward (pseud.), *Aunt Fanny's Home, and her Talks about God's Works* (Philadelphia, 1863), pp. 5, 95, 205.

<sup>95</sup>F.L. Mortimer, *The Peep of Day; or, A Series of the Earliest Religious Instruction the Infant mind is capable of receiving* (New York, c.1848), pp. 13, 44.

only way'.<sup>96</sup>

Older children received more sophisticated theological instruction supported by astronomical examples. In one story a young boy exclaimed: 'How wonderful, mamma, that God should give us the Bible, and even condescend to send his Son to save us from hell, if ours is such a tiny world compared to others'. His mother replied that

If this should be the only region which sin has tainted, Alexander, how deep must be God's abhorrence of it, that so small a corner of his dominions could only be rescued from entire ruin by such a price. Seek the Saviour yourself, my precious child, and then spread the glad tidings of his atoning love by every means in your power; for "they that turn many to righteousness, shall shine as the stars for ever and ever".<sup>97</sup>

These examples from evangelical children's literature on science raise the question whether it was different from other types of children's literature. In its emphasis on certain evangelical motifs--a fallen earth, the wrath of God displayed in nature, and, most importantly, the need for redemption--it was different. By the 1820s, evangelicals had begun to target children, most notably during Sunday school classes, in an attempt to precipitate conversions. Teachers sought to transfer to children both knowledge of, and an intense feeling for, humanity's depravity and need for regeneration. Curricula did of course focus mainly on the Bible.<sup>98</sup> Yet in their quest for conversions, evangelicals came to perceive the utility of moral lessons derived from astronomy, testifying to their respect for science as an important spur to moral regeneration.

However, it does appear that evangelicals began publishing children's

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<sup>96</sup>Anon., *The Infant Reader. Or Easy Lessons in Reading for Little Boys and Girls* (Philadelphia, 1850).

<sup>97</sup>Anon., *What is a Star?* (New York, n.d. but before 1851), p. 16.

<sup>98</sup>A. Boylan, 'The Role of Conversion in Nineteenth-century Sunday Schools', *American Studies*, 20 (1979), 35-48; idem, 'Sunday Schools and Changing Evangelical Views of Children in the 1820s', *Church History*, 48 (1979), 320-33.

literature which included significant sections on science only in the late 1840s. This reflected three developments: the rising popularity of science in America, a growing awareness that science could be used to advance evangelical interests, and the desire of evangelicals to teach their children the proper attitude to assume towards nature. In its didactic teachings and God-centredness, however, evangelical children's literature accurately reflected the tenor of all antebellum children's literature.

Ultimately, Americans valued that children's literature which would best serve to produce pious and morally self-reliant children. Indeed, the 1820s had witnessed a new emphasis on children who, it was widely believed, needed to be properly educated so that as adults they would safeguard the future of a virtuous and god-fearing American republic.<sup>99</sup> Children's literature, therefore, had a significant political dimension. Such wider socio-political agendas were not unique to American children's literature. As James Secord has shown, Newtonian science had entered the family circle in Britain by the mid-eighteenth century, lending its authority to Georgian society and teaching moral codes, good manners, and social deference.<sup>100</sup> Like their British counterparts, American parents were exceedingly careful to distinguish suitable from unsuitable knowledge for their children, and they used social and moral criteria as benchmarks. A premium was placed on safety and moral purity, for children, it was believed, possessed minds and hearts which were

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<sup>99</sup>A.S. MacLeod, *A Moral Tale: Children's Fiction and American Culture 1820-1860* (Hamden, Conn., 1975); *idem*, 'Children's Literature and American Culture 1820-1860', in J.H. Fraser, ed., *Society & Children's Literature* (Boston, 1978), pp. 11-31; G.S. Murray, 'Rational Thought and Republican Verities: Children's Literature, 1789-1820', *Journal of the Early Republic*, 8 (1988), 159-77; *Science in Nineteenth-century Children's Books: An Exhibition based on the Encyclopaedia Britannica Historical Collection of Books for Children* (Chicago, 1966); W.M. and M.S.C. Smallwood, *Natural History and the American Mind* (New York, 1941), pp. 217-28.

<sup>100</sup>J.A. Secord, 'Newton in the Nursery: Tom Telescope and the Philosophy of Tops and Balls, 1761-1838', *History of Science*, 23 (1985), 127-51.

'easily formed and moulded'. Parents were advised to make their children 'virtuous and mild, and self-denying, and benevolent, and pious, and therefore happy'.<sup>101</sup> By using examples from astronomy to teach children, Americans in effect demonstrated the highest regard for astronomy's socio-political utility and moral sanctity.

#### 8.4 Children's Literature and Gender in Antebellum American Astronomy

Another striking aspect of American children's literature is the prominent role women played--both in educating children and in the command they demonstrated over the sciences--in these books. Here my reading differs from that of Greg Myers, for when he looked at popular science literature written for women and children in Britain, he saw it as an inferior form of science created specifically for an audience of outsiders.<sup>102</sup> Yet I would argue that American children's literature supports the conclusions of Margaret Rossiter, Sally Kohlstedt, Deborah Warner and others that women were better educated and had a larger role in science in antebellum America than one might at first expect from British sources.<sup>103</sup>

For example, one text depicted a wise grandma, Mrs Vicars, talking with her grandchildren, Frank and Louisa, about astronomy:

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<sup>101</sup>Anon., 'A Child', *American Magazine of Useful Knowledge*, 2 (1835), 22.

<sup>102</sup>G. Myers, 'Science for Women and Children: The Dialogue of Popular Science in the Nineteenth Century', in J. Christie and S. Shuttleworth, eds., *Nature Transfigured: Science and Literature, 1700-1900* (Manchester, 1989), pp. 171-200: 172-73, 176.

<sup>103</sup>M.W. Rossiter, *Women Scientists in America: Struggles and Strategies to 1940* (Baltimore, 1982), pp. 1-15; S.G. Kohlstedt, 'In from the Periphery: American Women in Science, 1830-1880', *Signs*, 4 (1978), 81-96; D.J. Warner, 'Science Education for Women in Antebellum America', *Isis*, 69 (1978), 58-67; L.L. Stevenson, 'Little Women? The Female Mind at Work in Antebellum America', *History Today*, 45 (Mar. 1995), 26-31.

Frank--How do astronomers look, and where do they live?

Mrs Vicars--They live in houses and look like other men.

Frank--Do they eat and drink?

Mrs Vicars--Oh yes. They observe the sun, moon and stars a great deal, but they cannot live upon moon beams, or starlight.

Frank laughed; but said he supposed they looked wiser than other men; and that he did think their faces shone from looking at the sun and stars so much. Mrs Vicars told him that she sometimes thought they looked paler than other men from studying so hard, and keeping awake so much in the night.

[Later in the conversation, Frank exclaims] I mean to be an astronomer! don't you, sister Louisa? and then we will find out some new stars.

Louisa--Oh yes, I mean to learn all that you do.

Frank--Can girls be astronomers grandma?

Mrs Vicars--Oh yes; they can learn astronomy, but when they grow up, they have not, commonly, much time to watch the stars.<sup>104</sup>

This dialogue is especially revealing in three ways. First, both children expressed a keen interest in astronomy, with Frank strongly desiring to become an astronomer. Second, while Mrs Vicars gently corrected Frank's fanciful notions about astronomers, she expressed respect for their dedication. This indicates that astronomy as a vocation was becoming increasingly respectable in America in the 1830s. Third, and most importantly, when Frank and Louisa had questions on astronomy, they talked to grandma, not dad or grandpa. At least when talking to children, women were recognized as sources of scientific authority in America. And Louisa's aspiration that she would master whatever her brother learned, including astronomy, was accepted without question. Mrs Vicar's comment here that most grown women lacked time to study was not intended to be discouraging: it was simply fact.<sup>105</sup>

A different book, published by the Presbyterian Board of Education, introduced another resourceful and knowledgeable woman: Aunt Fanny.<sup>106</sup> Described as a pious maiden, between thirty and forty, Aunt Fanny was an

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<sup>104</sup> *Real Stories of Real Children. Designed for Infant Schools, and small children in families, Part I* (Boston, 1833), pp. 54-56.

<sup>105</sup> Intellectual pursuits were somewhat of a luxury for women in antebellum America, as pointed out by S.G. Kohlstedt, 'In from the Periphery', 85.

<sup>106</sup> Edward (pseud.), *Aunt Fanny's Home* (Philadelphia, 1863).

independent woman of means. She took charge of three nephews aged fourteen, twelve, and ten. With her kaleidoscope and an extensive knowledge of science--she was conversant with the properties of the atmosphere and weather as well as with astronomy--she taught the boys about God's works, inspiring all three to live noble, productive lives, with one boy becoming a minister. The first page of a third book, this one published by the American Tract Society and entitled *What is a Star?*, showed a mother talking to her son in front of a fireplace with a celestial globe prominent behind them. In the text, the mother demonstrated razor-sharp proficiency in astronomy, quoting John Herschel, giving a well-informed history of astronomy, and teaching her son the nature of double stars as well as other object lessons in astronomy.<sup>107</sup>

I wish to make several points about these stories. First, this parlour scene between mother and son reinforces Kohlstedt's point that knowledge of science was introduced first in the home, specifically in the parlour for middle-class families.<sup>108</sup> In this social space, mothers held sway as expert teachers of their children. As industrialization, urbanization and changing patterns of work took fathers away from home and family, a 'cult of domesticity' was created, becoming firmly entrenched by the 1820s, in which women's role as wives and mothers entrusted with the moral upbringing of future generations was exalted.<sup>109</sup> As the quintessential upholders of

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<sup>107</sup>Anon., *What is a Star?*, n.d. but before 1851. The American Tract Society also published Thomas H. Gallaudet's *The Youth's Book on Natural Theology* (New York, 1832), which consisted of a dialogue between mother and son on the wonders of nature. This was later re-titled as *The Class-book of Natural Theology, for Common Schools and Academies*.

<sup>108</sup>S.G. Kohlstedt, 'Parlors, Primers, and Public Schooling', 429.

<sup>109</sup>N.F. Cott, *The Bonds of Womanhood: 'Woman's Sphere' in New England, 1780-1835* (New Haven, 1977), pp. 8, 67-75, 148; L.K. Kerber, *Women of the Republic: Intellect and Ideology in Revolutionary America* (Chapel Hill, 1980), esp. ch. 7 on 'Education and Intellect in the Early Republic'; R.D. Brown, *Knowledge is Power: The Diffusion of Information in Early America, 1700-1865* (Oxford, 1989), ch. 7, 'Daughters, Wives, Mothers: Domestic Roles and the Mastery of Affective Information, 1765-1865', esp. pp. 163-65.

morality and protectors of the republic's virtue, it is revealing that women were shown teaching their children aspects of astronomy. This offers convincing testimony that Americans perceived astronomy to be morally beneficial. Women characters like Aunt Fanny, moreover, exerted a powerful moral influence while providing attractive role models for both girls and their mothers. Girls learned that they could acquire extensive knowledge of the heavens, and mothers learned that they could acquire the skills to teach astronomy to their children. In portraying determined, intelligent and independent women, evangelical children's literature accurately represented and reinforced the leading role women were playing in revivals and reformist movements in antebellum American society.<sup>110</sup>

It is important to note, however, that in these texts women were not so much teaching astronomy *per se* as they were teaching Christian morality, values and responsibilities through engaging examples drawn from astronomy. Such examples, it was argued, were more likely to appeal to children's innate curiosity than those drawn strictly from theology. The primary goal was to teach children the proper, worshipful attitude to assume towards God's works. One author pointed the way by showing how one small child, when asked what the moon was, answered 'It is God, looking out of the sky'. This, the author noted, was 'an answer full of poetical beauty, and of more than poetical truth', proving that natural objects could help children to reach important conclusions about God long before their minds were able to grasp more abstract theological concepts.<sup>111</sup>

Besides its utility in helping to produce pious and morally sound

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<sup>110</sup> See especially C. Smith-Rosenberg, 'The Cross and the Pedestal: Women, Anti-Ritualism, and the Emergence of the American Bourgeoisie', in *Disorderly Conduct: Visions of Gender in Victorian America* (Oxford, 1985), pp. 129-64.

<sup>111</sup> J. Pierpoint, *On the Moral Influences of Physical Science* (Boston, 1833), pp. 7-8.

children, astronomy was thought to be particularly well suited to women for two reasons. First, it was thought to invigorate the emotions without overstimulating them. Because women supposedly fell prey to their emotions far more often than men did,<sup>112</sup> some commentators worried that popular fiction, with its 'unnatural craving for excitement',<sup>113</sup> might lead women astray. Astronomy, especially popular writings on it, were in contrast thought to provide a calming effect, producing 'not that sudden excitement or ecstasy, which wears out life, but... a continued glow of exalted feeling....'<sup>114</sup> Second, as with botany, popular astronomy was considered to be an aspect of refined, polite and fashionable culture. It was, therefore, consistent with femininity as constructed in Victorian society. Unlike (say) geology, which, in requiring grubby and physically demanding fieldwork, was somewhat inhospitable to women, women could practice astronomy in their homes. Astronomy, at an amateur level anyway, was often situated within the boundaries of the domestic sphere, the woman's sphere.

Such cultural incentives go some way towards explaining why women found popular astronomy congenial. Yet the extensive knowledge of astronomy which these women displayed requires further explanation. Where did they get it? In some cases from books: two astronomical texts were written specifically for women--M.R. Bartlett's *Young Ladies' Astronomy* (1825) and Denison Olmsted's *Letters on Astronomy, Addressed to a Lady* (1841)--and other texts and authors

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<sup>112</sup>Highly suggestive here is M. Benjamin, 'Elbow Room: Women Writers on Science, 1790-1840', in M. Benjamin, ed., *Science and Sensibility: Gender and Scientific Enquiry, 1780-1945* (Oxford, 1991), pp. 27-59, esp. 36-52.

<sup>113</sup>W.M. Rogers, 'Pleasures of Science', in *Scientific Tracts* (Boston, 1836), pp. 145-60.

<sup>114</sup>D. Olmsted, *Letters on Astronomy*, p. 12.



made it a point to address both sexes.<sup>115</sup> In other cases from lectures at lyceums and elsewhere: broadsides for these singled out women and urged them to attend. Here I differ with Susan Lindee, who saw popular science books and lectures as essentially conservative and as offering casual entertainment only.<sup>116</sup> I take her point that formal education in the sciences at female academies entailed institutional approval of a serious course of scientific study by women, approval that represented a considerable step forward for women in science. Yet I suspect that popular science books and lectures may have proved equally important for women's intellectual progress, especially for those women who were unable to attend secondary schools or colleges.

For example, Linda Kerber has noted that in 1805 twenty young women formed the Boston Gleaning Circle, which met every week to discuss books 'favourable to the improvement of the mind'. Works of 'Divinity, History, Geography, Astronomy, Travels, Poetry &c.' were all discussed, but not novels or romances.<sup>117</sup> In such localized and informal discussion societies, popular science books were potentially powerful sources for self-improvement, offering temporary liberation from cultural conventions. Four decades later, young mill girls in Lowell, Massachusetts wrote their own texts to educate themselves in the sciences. In a chapter devoted to astronomy, an anonymous 'mill girl' chose the literary form of a dialogue among three young women. 'Ellinora' enthused that 'I love the stars.... Their rays seem to come from the eye of God Himself. They enter my heart... they spread light and peace.

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<sup>115</sup> See, for example, H. Wilbur, *Elements of Astronomy, Descriptive and Physical* (New Haven, 1830), which addressed itself to seminaries for young ladies. Joseph Emerson, who wrote *Outline of a Course of Astronomical Lectures* (Boston, 1819), was an instructor at the Byfield Seminary for Young Ladies; the Rev. John L. Blake, author of *First Book in Astronomy* (Boston, 1831), began as a teacher at a school for girls.

<sup>116</sup> M. Susan Lindee, 'The American Career of Jane Marcet's *Conversations on Chemistry, 1806-1853*', *Isis*, 82 (1991), 8-23: 22-3.

<sup>117</sup> L. Kerber, *Women of the Republic*, p. 241.

My "better land" is among the stars'. Another character, Ann, confessed that 'I feel my ignorance so painfully, and a desire for knowledge is so strong within me!'.<sup>118</sup> The poignancy of this confession is accentuated by Kohlstedt's reminder that, when compared with men, 'There was not equality of opportunity or condition' for women in antebellum America and that 'it was possible but not probable that women could pursue scientific interests'.<sup>119</sup>

Unfortunately, we know fairly little about such discussion groups and informal gatherings. This raises a point, familiar to historians of science, about the need to guard against the bias of institution-based sources. Their very availability may lead one to grant them undue emphasis in historical accounts. To be sure, women often learned astronomy in public schools and at many colleges.<sup>120</sup> That they could learn astronomy still had to be asserted from time to time. 'I have often heard it observed, that it [astronomy] is entirely useless in the system of female education', Alvah Clark wrote. 'If the objection arise from the opinion, that the female mind is not competent to the investigation of the Elements of Astronomy, I leave it to the contempt it so justly deserves'.<sup>121</sup> Perhaps such statements helped to silence a few scoffers and naysayers.

It would appear that scoffers and naysayers were thinner on the ground

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<sup>118</sup> 'Chapters on the Sciences. Astronomy', *Lowell Offering: A Repository of Original Articles, written by Females Employed in the Mills*, 2 (1842), 225-36: 225-27. Contemporaries defined the 'ideal' mill girl as being educated and refined, working only temporarily out of financial expediency. She often taught school during the summer. See T.P. Martin, *The Sound of our Own Voices: Women's Study Clubs 1860-1910* (Boston, 1987), pp. 7-8.

<sup>119</sup> S.G. Kohlstedt, 'Parlors, Primers, and Public Schooling', 444.

<sup>120</sup> Prior to 1861, at least six women's schools had astronomical observatories, with Packer Collegiate Institute possessing a six-inch refractor. See D.J. Warner, 'Women Astronomers', *Natural History*, 88 (1979), 12-26: 12.

<sup>121</sup> A. Clark, *A New System of Astronomy, in Question and Answer, for the Use of Schools and Academies* (New York, 1820), p. v.

in America than in Britain. As P.A. Kidwell has noted, middle-class women in antebellum America had more opportunities to acquire a grounding in astronomy than their British counterparts.<sup>122</sup> This is not to say that women in Britain failed to make contributions to astronomy. Besides the famous examples provided by Caroline Herschel and Mary Somerville, ladies of wealth and leisure in the eighteenth century, using books and periodicals written especially for them, studied the heavens, intrigued by claims of a plurality of worlds and inspired by astronomy's moral benefits.<sup>123</sup> By the end of the century the schoolmistress and popularizer Margaret Bryan had written a textbook, the *Compendious System of Astronomy* (1797), which she dedicated to her female pupils.<sup>124</sup>

Yet for presuming as a woman to write on astronomy, Bryan felt it necessary to defend herself in her preface.<sup>125</sup> From about 1800 to 1850 it would seem that, in seeking to restrict middle-class women to the home, British writers both male and female sought to limit a woman's intellectual activities to those which would best prepare her for her all-important domestic chores while also safeguarding and strengthening her piety. Thus Sarah Ellis, a leading commentator on women's duties and manners, advised her female readers that 'A slight knowledge of science in general is all which is here recommended... above all, to enlarge our views of the great and glorious attributes of the Creator'. Women were not to aspire to excel in learning

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<sup>122</sup>P.A. Kidwell, 'Women Astronomers in Britain, 1780-1930', 534-36.

<sup>123</sup>G.D. Meyer, *The Scientific Lady in England 1650-1760: An Account of her Rise, with Emphasis on the Major Roles of the Telescope and Microscope* (Berkeley, 1955); M.H. Nicolson, 'Virtuoso', in P.P. Wiener, ed., *Dictionary of the History of Ideas* (New York, 1973), IV, 486-90: 488-90.

<sup>124</sup>On Bryan see G.D. Meyer, *Scientific Lady*, pp. 105-07, and *DNB*, III, 154.

<sup>125</sup>M. Bryan, *A Compendious System of Astronomy, in a course of familiar lectures* (London, 1797), p. ix. See also M. Benjamin, 'Elbow Room', pp. 40-43.

(unless such excellence was subjugated strictly to piety); rather, they were to seek to make themselves 'more companionable to men'.<sup>126</sup> A smattering of science could prove useful here. The author and poet Mary Anne Stodart, writing for the evangelical *Christian Lady's Magazine*, went further and asserted that the practice of science was entirely masculine and therefore unbecoming a woman's role. 'I would rather see you the plainest and simplest house-wife, attending to your home duties', she declared, 'than the most learned scientific lady neglecting them'. In a remarkable passage, she cautioned her readers that 'I had no thought of ladies' competing with men on the field of science; I should as soon think of their appearing with their liege lords, in martial array, on the field of battle'. Just as the battlefield was unmistakeably the exclusive preserve of men, perhaps providing the ultimate test of Victorian manhood, so for Stodart was the field of science man's exclusive preserve.<sup>127</sup>

For Ellis and Stodart, middle-class women were not to act as bold producers but as cautious consumers of science, constantly on-guard against impious writers. Ellis's and Stodart's ideal of womanhood was the consensus view of purveyors of proper behaviour and decorum in Britain in the 1820s and 1830s. Yet by the 1840s many commentators had decided that women could pursue those subjects for which they were best suited, either by temperament or intellect, as long as their pursuits did not interfere with their domestic duties.<sup>128</sup> The Rev. Benjamin Parsons was one such commentator; he called for the education of all women, to include education in the sciences. Yet the

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<sup>126</sup>S. Ellis, *The Daughters of England, their Position in Society, Character & Responsibilities* (London, 1842), esp. pp. 69, 97.

<sup>127</sup>M.A. Stodart, *Hints on Reading: Addressed to a Young Lady* (London, 1839), pp. 36-38, 44-6, 52.

<sup>128</sup>A.V. Gelling, 'Middle-class Women and the Ideology of Domestic Femininity, circa 1820-1860' (Oxford Univ. M.Litt. 1989), pp. 172-74.

arguments which he employed to advance his cause revealed that he too saw women's role in science as circumscribed by traditional gender roles. He avowed that a woman who studied astronomy 'would not worship God less devoutly; love her children less maternally; be a worse mistress of her house; a more uninteresting companion to her husband, nor a less intelligent guide to her offspring'. For Parsons women were to study astronomy as Christians, mothers, homemakers, wives, and teachers, but not as serious students.<sup>129</sup>

Women who strayed too far from conventional roles encountered opposition. When she embarked on a series of lectures to aid working-class women, Mary Smith, a schoolmistress and self-avowed nonconformist and admirer of Emerson, was severely criticized, ostensibly because she had failed to begin her Sunday night lectures with singing and a prayer. Interestingly, later in her life, the one lecture she remembered distinctly was entitled 'Making and Mending'. 'I led my small audience up to the great Maker and Mender', she recalled, 'and made them see, with David, the Heaven as the work of His fingers, and how from everlasting to everlasting they repeat His praise'.<sup>130</sup> Her language here is highly evocative and perhaps gender specific. For Smith, God was not an all-powerful Creator; rather, He was like a skilled seamstress, making and mending the universe with His fingers. Smith's gender may have led her to a different vision of God's role in creating and sustaining His universe. Then again, perhaps she was simply seeking to construct an account to which working-class women could relate. And perhaps both gender and pedagogical concerns were equally important in her

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<sup>129</sup>B. Parsons, *The Mental and Moral Dignity of Woman* (London, 1842), pp. 34-5, 327-35. Parsons cited Mary Somerville as proof that women were as intellectually capable as men, but he failed to develop this point. See also *idem*, *Education, the Birthright of Every Human Being, and the Only Scriptural Preparation for the Millennium* (London, 1845), p. 83.

<sup>130</sup>M. Smith, *The Autobiography of Mary Smith, Schoolmistress and Nonconformist* (London, 1892), pp. 210-11, 270-71.

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Despite the efforts of Mary Smith and other like-minded reformers, women who wished seriously to study astronomy in Britain faced near insuperable difficulties. Mechanics' institutes and literary and philosophical societies were bastions of masculinity, as shown by the observation of the shipwright Christopher Thomson that

there are numbers ready to declare, that if you once admit females to such societies [for self-help], they will be out of their place, and the society will fail. Are they justified, by experience, in so saying? or do they speak upon the credit of the old prejudiced rule, that women had no right to mingle in such assemblies?<sup>131</sup>

That Thomson believed it necessary to call for equality of access for women plainly suggests that such access was rarely granted.

It appears that women in Britain who learned more than a few basic facts about astronomy were usually self-educated or taught by their fathers. Working-class women suffered a 'double restriction' in that education in general was thought to be improper for them both as a gender and as a class.<sup>132</sup> As noted previously, their middle-class counterparts were encouraged to acquire only a smattering of knowledge about science. Middle-class women found themselves marginalized by specialist organizations like the British Association, although they were encouraged to attend the Association's yearly meetings in their role as mothers teaching future generations of (male) scientists. Their attendance further served to place a moral stamp of approval on the male-dominated proceedings, and their admission fees helped

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<sup>131</sup> C. Thomson, *The Autobiography of an Artisan* (London, 1847), p. 380.

<sup>132</sup> J. Swindells, *Victorian Writing and Working Women: The Other Side of Silence* (Cambridge, 1985), esp. pp. 128-35. D. Vincent briefly notes that working-class men actively discouraged their wives' participation in self-improvement: see his 'Reading in the Working-class Home', pp. 206-26 in Walton & Walvin, *Leisure in Britain 1780-1939*, on pp. 220, 226.

the British Association to turn a profit.<sup>133</sup>

Middle-class women in antebellum America were more fortunate. By the 1840s, most secondary students, boys and girls, were taught basic facts about the solar system and universe as part of a course in natural philosophy. A few women went on to study astronomy at women's academies like Mary Lyon's Mount Holyoke Seminary (1835). Indeed, at some co-educational institutes, women were able to enrol in more science courses than were men.<sup>134</sup> Yet women in science were still not expected to challenge men as equals; the few who did encountered considerable obstacles.<sup>135</sup>

Why did middle-class women in America (at least in the Northern states) have more opportunities to study science than their sisters in Britain? Perhaps the patriotic vision of mothers as educators of the future citizens of the republic was more powerful than equivalent, if slightly different, visions in Britain. Yet I would emphasize the greater enthusiasm with which American evangelicals embraced the sciences, especially astronomy, as being conducive to and constitutive of piety. Even more so than in England and even Scotland, the goal of education in America was to unite intellectual with moral discipline. In this effort, no subject was seen as 'better calculated... to raise in the mind a highly improved state of moral sentiment,

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<sup>133</sup> J. Browne, 'A Glimpse of Petticoats: Women in the early years of the British Association for the Advancement of Science', paper given at the conference on 'Science and British Culture in the 1830s', Trinity College, Cambridge, 6-8 July 1994.

<sup>134</sup> Women normally had greater flexibility in selecting courses in that, unlike men, they did not commonly pursue a particular profession or more advanced degrees. See S.G. Kohlstedt, 'Curiosities and Cabinets: Natural History Museums and Education on the Antebellum Campus', *Isis*, 79 (1988), 405-26: 422-23.

<sup>135</sup> Maria Mitchell had trouble gaining access to professional astronomical circles; she compensated by teaching and surrounding herself with female pupils. See S.G. Kohlstedt, 'Maria Mitchell and the Advancement of Women in Science', in D. Outram and P.B. Abir-Am, eds., *Uneasy Careers and Intimate Lives: Women in Science, 1789-1979* (New Brunswick, New Jersey, 1987), pp. 129-46.

and moral feeling' than astronomy.<sup>136</sup> And, perhaps crucially, whereas in Europe schoolteaching as a profession remained dominated by men until the end of the nineteenth century, by the 1840s women were being employed in unprecedented numbers in American schools, in part because they could be paid less than men, but largely because Americans saw education in moral terms and classrooms as extensions of the home.<sup>137</sup> Americans, therefore, perceived schools to fall within the women's sphere. As teachers, women were encouraged to acquire at least a rudimentary knowledge of science. It comes as no surprise, then, that the frontispiece of John L. Blake's *First Book in Astronomy* (1831) showed two teenage boys looking through a small telescope, with a female teacher standing by their side, using her right hand to point up towards the sky while her left hand held open a chart of the solar system.

And perhaps the popularity of Dick's works in America helped women to learn science as well. Indeed, Dick was farsighted in his advocacy of education for women. He stood almost alone in Britain in 1835 when he declared that women should be able to earn academic degrees, even doctorates, and he applauded Mary Somerville's work as 'do[ing] honour to the first philosophers of Europe'.<sup>138</sup> Perhaps Dick's second wife, Euphemia, a skilled demonstrator of scientific experiments, encouraged her husband to issue such statements. But it is also true that Dick, like most

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<sup>136</sup>Rev. J.L. Blake, *First Book in Astronomy, Adapted to the Use of Common Schools* (Boston, 1831), p. iv. Given its moral sanctity, Hervey Wilbur concluded that 'We may therefore rest assured, that the science of Astronomy can be profitably commenced in the early stages of common school education'. See his *Elements of Astronomy* (New Haven, 1830), p. 125.

<sup>137</sup>J.K. Conway, 'Politics, Pedagogy, and Gender', *Daedalus*, 116 (Fall 1987), 137-52. L. Stevenson notes that as many as one in four women in New England taught in schools before marrying; see her 'Little Women?', 27.

<sup>138</sup>Dick, *Sidereal Heavens*, p. 316, note.



commentators,<sup>139</sup> continued to conceive of women largely in their role as mothers who determined the moral 'principles and characters of mankind'. Thus he argued that women who were educated in astronomy would naturally transfer to their children their appreciation for God's wisdom, power, and goodness as displayed in the heavens.<sup>140</sup>

This chapter has looked at the meteoric rise of astronomy in antebellum America and the prominent role played therein by Thomas Dick. Crucially important to its success was astronomy's flexibility as a cultural resource. Professional astronomers, critics of theirs such as Emerson, educational reformers, popularizers like Dick, evangelicals, and women all adapted astronomy for their purposes. It only serves to heighten astronomy's significance, I believe, to say that astronomy's value or its meaning was not intrinsic but rather depended on, and was adjusted to fit, its audience. The varied readings these audiences produced demonstrates the complexity of antebellum American culture.

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<sup>139</sup>For example, New England ministers: see N.F. Cott, *Bonds of Womanhood*, p. 86.

<sup>140</sup>Dick, *Mental Illumination*, pp. 301-03. Dick was called upon on at least two occasions to aid in the founding of women's colleges: see NLS MS 9658 ff 28-9, f 76.

### Conclusion

This thesis has provided a detailed, thematic and contextualized biography of Thomas Dick. It has used the lens which was Dick's life to peer more closely into the nature of science, evangelicalism, and popular culture in Victorian Britain and antebellum America. Fashioning an identity for himself as a Christian philosopher, Dick sought to Christianize science, thereby inhibiting secularization and persuading evangelicals that the pursuit of science honoured God. By espousing a doxological theology of nature, he redefined the practice of Christianity, insisting that Nature was one of God's two holy revelations and that it needed to be worshipped with the same reverence and respect as Scripture. It followed that teachers of natural knowledge were deserving of the same social status and pay as ministers.

In seeking to educate all social classes, high and low, Dick disseminated a form of popular science charged with religious meaning and embedded with pious reflections and devotional utterances. Like St. Paul, he was unashamed to win converts to Christianity 'by guile', seducing them with astonishing statistics and with beautiful and sublime 'celestial scenery'. His writings revealed the complexities and ideological nature of popularization. He further insisted that cultivators of science were not to become full-time professionals in science. Instead, science--conceived as the study of God's attributes and manifestations in the physical universe--was a form of worship which was to remain open to the entire community of believers. Not surprisingly, Dick encountered opposition to his claims for cultural authority, especially from those evangelicals who were more closely tied to revealed religion.

Just as the roles and status of science in culture were being hotly disputed, so too were specific theories in science being debated within cultural realms in which religious and socio-political interests were

fundamental. Dick's religious beliefs shaped the content of his science and informed his decisions as to what constituted 'valid' knowledge. His support of the plurality of worlds, the nebular hypothesis, and the 'gap' theory in geology cannot be explained independently of his religious beliefs. Dick's writings on these issues illustrate the sheer complexity of relations between evangelicalism and science. With respect to socio-political interests, Dick used aestheticized forms of natural knowledge, impregnated with evangelical tenets and devotional reflections, to regulate and reform the behaviour of all social classes. Yet his reformist platform was strikingly similar to that of Combe and other reformers who were opposed to evangelicalism but who saw education in science as promoting norms of behaviour which were consistent with respectable, middle-class values.

Testifying to Dick's influence were the immense sales of his works in Victorian Britain and especially in America from c.1826 to c.1880. This underscored the importance and continuing attractiveness of sanctified forms of natural knowledge. To be sure, Dick's texts were read and used in ways which he could not predict, let alone control. Yet the acclaim which his texts earned for their religiosity serves as a caution to those who would exaggerate the rapidity of Christianity's decline and the subsequent rise of more secular forms of knowledge.

Indeed, to the uncritical modern reader, Dick might be considered one of history's losers, for it would appear that his vision of a science made sacral was superseded in the last three decades of the nineteenth century by a science which ruthlessly eliminated religious concerns. Certainly, within intellectual circles frequented by agnostics like Thomas Henry Huxley, theologies of nature based on Christian revelation were considered outmoded. Instead, new approaches to nature, free from 'superstitious' references to Scripture, were promulgated. Historians have studied this transformation from

several different angles and have reached different, if sometimes complementary, conclusions.<sup>1</sup>

Yet, among less intellectually sophisticated audiences, theologies of nature may have retained their apologetic and devotional functions much longer than most historians have hitherto acknowledged. As the schoolmistress Mary Smith observed,

On myself and my mode of thought, this book [Chambers's *Vestiges*], and its successors in the same field, effected little change. Its arguments were to me much harder to believe than the dear old truths of the Bible, and the divine doctrines of the New Testament. These latter revive and quicken and inspire the spirit of man, thus proving their truth, as the organ of vision proves the light of day. Like Thomas Carlyle, my own early life owed its best and brightest influences to the devout Calvinism under which it was reared. Religion, I think, has little to fear from scientific inquiry, or its endlessly changing theories of nature and man.<sup>2</sup>

As this quotation would seem to suggest, new theories or discoveries in science did not necessarily lead to a decline in belief.

Even among the most intellectually sophisticated of practitioners, a deep respect for the Bible as a source for insights into the way in which nature functions persisted for some time. In Scotland, James Clerk Maxwell continued to draw on Christian theology in his theoretical physics. Like Dick, he believed that science led one to a deeper appreciation for God's glory, and his faith in the verity of Genesis was heartfelt and sincere.<sup>3</sup> Joining Maxwell were two fellow Scotsmen, Balfour Stewart and P.G. Tait, whose *The Unseen Universe* (1875) defended Trinitarian Christianity and the existence

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<sup>1</sup>See especially J.R. Moore, 'Crisis without Revolution: The Ideological Watershed in Victorian England', *Revue de Synthèse*, 4 (1986), 53-78, esp. 66-72. See also chapter one, section three.

<sup>2</sup>M. Smith, *The Autobiography of Mary Smith, Schoolmistress and Nonconformist* (London, 1892), pp. 162-63 (emphasis added).

<sup>3</sup>On Maxwell's sincerity see D.B. Wilson, 'Victorian Science and Religion', *History of Science*, 15 (1977), 52-67. Crosbie Smith concludes that Maxwell's theology of nature was quite similar to that of Chalmers. See his 'From Design to Dissolution: Thomas Chalmers' Debt to John Robison', *BJHS*, 12 (1979), 59-69: 69.

of an afterlife against the materialism espoused by John Tyndall.<sup>4</sup>

At a less sophisticated level, Hugh MacMillan (1833-1903), a Free Church (Presbyterian) minister in Glasgow, extolled a devotional theology of nature in his *Bible Teachings in Nature* (1867). This passed through fifteen editions in twenty-two years.<sup>5</sup> Similarly, in postbellum America the Rev. Enoch Fitch Burr, pastor of a rural congregation in Connecticut and a former pupil of Denison Olmsted, weighed in with his *Ecce Coelum; or, Parish Astronomy* (1867). Like Dick, Burr argued that astronomy represented 'the best example we have of polished completeness in a science, and the noblest specimen we have of an epic poem'. His book quickly passed through sixteen editions.<sup>6</sup> Meanwhile, Dick's works continued to be reprinted in America into the 1880s. These devotional works need to be examined further, together with the ways in which new scientific ideas affected the beliefs and religious practices of 'ordinary' Christians.<sup>7</sup>

That Dick has largely been forgotten in this century, however, provides some indication of the extent to which late nineteenth-century culture became secularized. This can be seen in the works of two leading popularizers of astronomy, Agnes Clerke and Richard Anthony Proctor, who succeeded Dick in the 1870s and 1880s. Unlike Dick, Clerke wrote more for her fellow astronomers than for educated lay readers, and Proctor's works, although written for general readers, contained few references to God or to natural theology.

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<sup>4</sup>P.M. Heimann, 'The Unseen Universe: Physics and the Philosophy of Nature in Victorian Britain', *BJHS*, 6 (1972), 73-9. See also Anon., 'The Unseen Universe', *Nature*, 12 (20 May 1875), 41-3.

<sup>5</sup>See *DNB* (2nd supplement, Jan. 1901 - Dec. 1911), II, 543-44. MacMillan also wrote *Sabbath of the Fields* (London, 1876), *Ministry of Nature*, and similar works.

<sup>6</sup>E.F. Burr, *Ecce Coelum; or, Parish Astronomy* (Boston, 1867), pp. 14, 151. On Burr see *DAB*, II, 321-22.

<sup>7</sup>These are issues to which I hope to return in the future.

Interestingly, Proctor shared with Dick an aesthetic response to the heavens and an emphasis on a plurality of worlds. However, Proctor's pluralism was motivated by a desire to magnify his profits rather than God's glory.<sup>8</sup> And while he found Saturn's rings emotionally moving, they did not move him to proclaim his admiration for God or to give thanks to Him.

Dick's successors, of course, were not seeking to win converts to Christianity or to advance the millennium. They therefore largely abandoned his emphasis on science as demonstrating God's physical attributes, his idea that the moral advantages arising from a study of science were paramount, and especially his belief that science had always to be 'prosecuted in connexion with the facts and principles of Revelation'.<sup>9</sup> Few of these popularizers were atheists; yet they tended to shunt God into their prefaces or conclusions and to forget about Him for the duration of their journeys. Largely forgotten too was Thomas Dick, whose Christian otherworldliness seemed irredeemably passé. However, to understand fully the piety, the optimism, the desire to improve oneself and to reform society in accordance with Christian principles, shared by so many Victorians in Britain and America, one should rediscover the works of Thomas Dick.

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<sup>8</sup>Bernard Lightman makes this point in an unpublished paper, 'R.A. Proctor's *Other Worlds than Ours*: Religion, Ideology, and Gender in Late-Victorian Astronomy'. My thanks to Dr. Lightman for allowing me to see a typescript of this paper.

<sup>9</sup>Dick, 'Introduction' to Elijah Burritt's *Geography of the Heavens* (New York, 1845), pp. xxii-xxiii.

## Appendix

## List of 144 Subscribers to Thomas Dick's Works, 1850

## I. Sorted Alphabetically

<u>Surname</u>	<u>Forenames</u>	<u>Title</u>	<u>Occupation</u>
Agnew	William G.E.	REV	Minister/Teacher
Allibone	Samuel Austin	ESQ	Merchant/Writer
Ashmead	Samuel	ESQ	Merchant
Atwood	John M.	MR	Merchant
Bailey	James T.	MR	Unknown
Barclay	James J.	ESQ	Attorney
Barcroft	Stacey B.	MR	Merchant
Barnes	Albert	REV	Minister (Presb.)
Bayard	James	ESQ	Attorney
Beaver	Thomas	MR	Merchant
Bicking	George H.	MR	Merchant
Biddle	Thomas A.	MR	Stock Broker
Bond	Henry	MD	MD and Author
Bovard	H.	MR	Unknown
Brown	Benneville	MR	Tailor [?]
Brown	George W.	MR	Grocer [?]
Buehler	Martin	MR	Hardware Dealer
Campbell	Hugh	MR	Merchant
Campbell	Quintin	MR	Indefinite
Carr	Edward	MR	Indefinite
Charnley	William S.	MR	Stock Broker
Cleveland	C.D.	PROF	Young Ladies' School
Coates	A.	MR	Tanner
Collins	Simeon	MR	Daguerreotypist
Colwell	Stephen	MR	Iron Manufacturer
Cooper	John	MR	Indefinite
Cresson	Elliot	MR	Merchant/Philanthr.
Cressy	James	ESQ	Unknown
Cuyler	Theodore	ESQ	Attorney
Davis	Edward M.	MR	Merchant/Importer
Davis	Henry R.	MR	Stock Broker
Dawson	M.L.	MR	Gentleman
Devereux	John James	ESQ	Attorney
Dock	Jacob	MR	Unlisted
Donnell	C.	ESQ	Bank Cashier
Dorsey	Benedict & Son	MR	Crockery Ware
Elkinton	John A.	DR	MD & Alderman
Ellis	Charles	MR	Druggist
Fallon	John	ESQ	Attorney
Foulke	William P.	ESQ	Attorney
Frost	John	PROF	Publisher
Fullerton	Alex	MR	Unlisted
Garrett	Thomas C.	MR	Merchant
Garrett	William E.	MR	Tobacconist
Garvin	William	MR	Unlisted
Gerhard	Benjamin	ESQ	Attorney

<u>Surname</u>	<u>Forenames</u>	<u>Title</u>	<u>Occupation</u>
Gillingham	Mary	MRS	Unlisted
Glenn	L.W.	MR	Perfumer
Goddard	Kingston	REV	Minister (Episc.)
Godey	Louis Antoine	MR	Publisher
Green	Anthony	MR	Merchant
Grigg	John	ESQ	Bookseller
Guillou	Rene	MR	Merchant
Hacker	Jeremiah	MR	Merchant
Hacker	William P.	MR	Chinaware
Hallowell	Morris L.	MR	Silk & Fancy Goods
Henderson	George	MR	Hatter
Hibbard	Edward	MR	Unknown
Hill	Marshall	MR	Merchant
Hoskins	Francis	MR	Merchant
Howell	Richard W.	MR	Attorney
Hutton	A.B.	MR	Unlisted
Johnson	Lawrence	MR	Unlisted
Julian	A.H.	MR	Merchant
Kelley	William Darrah	HON	Judge
Law	Edward E.	ESQ	Attorney
Lejce	William R.	MR	Unlisted
Lesley	Joseph	MR	Merchant
Lesley	Robert	MR	Hardware
Lewars	James E.	MR	Merchant
Longstreth	Thomas B.	MR	Bricklayer
Lothrop	Z.	MR	Merchant
McCall	Peter	ESQ	Attorney
McClelland	George W.	MR	Gentleman
McMichael	Morton	ED	Editor
Manderson	Andrew	MR	Lumber Merchant
Marot	William	MR	Bookbinder
Martin	James	MR	Indefinite
Maurice	William H.	MR	Stationer
Mellor	Thomas	MR	Importer
Moore	John S.	MR	Indefinite
Moore	John Weeks	ESQ	Bookseller
Morris	Robert	ED	Editor
Morrison	Anna D.	MRS	Unknown
Morton	Samuel C.	MR	Insurance Pres.
Mutter	Thomas D.	MD	MD & Author
Nancrede	Thomas D.	MR	Merchant
Nathans	Nathan	ESQ	Unlisted
Negus	J. Engle	ESQ	Unlisted
Norris	Isaac	ESQ	Attorney
Oakford	Charles	MR	Hatter
Okie	J.B.	ESQ	Inspector of Woolens
Padelford	Mary	MISS	Unlisted
Parker	Joel	REV	Minister (Presb.)
Parrish	Dillwyn	MR	Druggist
Paul	Bettle	MR	Merchant
Peacock	James	ED	Editor & Publisher
Perkins	Abraham R.	MR	Dry Goods
Perot	William S.	MR	Brewer
Pettit	Thomas McKean	ESQ	Attorney & Judge



<u>Surname</u>	<u>Forenames</u>	<u>Title</u>	<u>Occupation</u>
Potter	Alonzo	RTREV	Bishop of Penn.
Powers	Thomas H.	MR	Manufacturing Chem.
Price	Richard	MR	Merchant
Rea	John	MRS	Husband Sold Carpets
Reed	Willoughby	MR	Merchant
Ridgway	H.W.	MR	Unknown
Robins	Thomas	MR	Merchant
Scull	Alfred P.	MR	Merchant
Sharpless	Townsend	MR	Merchant, Dry Goods
Sharpless	William P.	MR	Merchant
Small	James	MR	Unlisted
Smyth	Anne	MISS	Unlisted
Snider	Jacob Jr.	MR	Wine Merchant
Spafard	John	MR	Unlisted
Sparhawk	Thomas P.	MR	Merchant
Starr	Isaac	MR	Unlisted
Stoddart	Curwin	MR	Dry Goods
Stokes	Samuel E.	MR	Merchant
Stranaghan	James	MR	Trimmings
Strathers	William	ESQ	Unlisted
Stuart	George H.	MR	Importer
Swain	William M.	ED	Editor & Publisher
Thomas		MRS	Unknown
Throckmorton	Edward	MR	Unlisted
Throckmorton	John W.	MR	Merchant
Townsend	Edward	MR	Dentist
Trego	Charles B.	MR	Gentleman
Truman	George	MD	MD
Van Pelt	Peter	REV	Minister (Episc.)
Van Renssalaer	Cortlandt	REV	Minister (Presb.)
Vanuxen	Henry	MR	Unlisted
Vogdes	William	PROF	Attorney
Wetherill	R.P.	MISS	Unlisted
Wharton	Thomas Isaac	ESQ	Attorney
Wharton		MISS	Unknown
Whelen	Edward S.	MR	Stock Broker
Whitall	John M.	MR	Merchant
White	Ambrose J.	MR	Merchant
Wiegand	John	MR	Instrument Maker
Wiggins	Emily	MISS	Unlisted
Williams	Henry J.	ESQ	Attorney
Wolfe	E.D.	MR	Merchant
Wright	George A.	MR	Importer
Yarnall	Edward	MR	Druggist

## II. Sorted by Occupation

<u>Surname</u>	<u>Forenames</u>	<u>Title</u>	<u>Occupation</u>
Barclay	James J.	ESQ	Attorney
Bayard	James	ESQ	Attorney
Cuyler	Theodore	ESQ	Attorney
Devereux	John James	ESQ	Attorney
Fallon	John	ESQ	Attorney
Foulke	William P.	ESQ	Attorney
Gerhard	Benjamin	ESQ	Attorney
Howell	Richard W.	MR	Attorney
Kelley	William Darrah	HON	Judge
Law	Edward E.	ESQ	Attorney
McCall	Peter	ESQ	Attorney
Norris	Isaac	ESQ	Attorney
Pettit	Thomas McKean	ESQ	Attorney & Judge
Vogdes	William	PROF	Attorney
Williams	Henry J.	ESQ	Attorney
Wharton	Thomas Isaac	ESQ	Attorney
Grigg	John	ESQ	Bookseller
Marot	William	MR	Bookbinder
Moore	John Weeks	ESQ	Bookseller
Perot	William S.	MR	Brewer
Longstreth	Thomas B.	MR	Bricklayer
Donnell	C.	ESQ	Bank Cashier
Hacker	William P.	MR	Chinaware
Dorsey	Benedict & Son	MR	Crockery Ware
Collins	Simeon	MR	Daguerreotypist
Townsend	Edward	MR	Dentist
Ellis	Charles	MR	Druggist
Parrish	Dillwyn	MR	Druggist
Yarnall	Edward	MR	Druggist
Perkins	Abraham R.	MR	Dry Goods
Stoddart	Curwin	MR	Dry Goods
McMichael	Morton	ED	Editor
Morris	Robert	ED	Editor
Peacock	James	ED	Editor & Publisher
Swain	William M.	ED	Editor & Publisher
Dawson	M.L.	MR	Gentleman
McClelland	George W.	MR	Gentleman
Trego	Charles B.	MR	Gentleman
Brown	George W.	MR	Grocer [?]
Buehler	Martin	MR	Hardware Dealer
Lesley	Robert	MR	Hardware
Henderson	George	MR	Hatter
Oakford	Charles	MR	Hatter
Rea	John	MRS	Husband Sold Carpets
Mellor	Thomas	MR	Importer
Stuart	George H.	MR	Importer
Wright	George A.	MR	Importer
Okie	J.B.	ESQ	Inspector of Woolens
Wiegand	John	MR	Instrument Maker
Morton	Samuel C.	MR	Insurance Pres.
Colwell	Stephen	MR	Iron Manufacturer

<u>Surname</u>	<u>Forenames</u>	<u>Title</u>	<u>Occupation</u>
Manderson	Andrew	MR	Lumber Merchant
Powers	Thomas H.	MR	Manufacturing Chem.
Bond	Henry	MD	MD and Author
Elkinton	John A.	DR	MD & Alderman
Mutter	Thomas D.	MD	MD & Author
Truman	George	MD	MD
Ashmead	Samuel	ESQ	Merchant
Atwood	John M.	MR	Merchant
Beaver	Thomas	MR	Merchant
Bicking	George H.	MR	Merchant
Barcroft	Stacey B.	MR	Merchant
Campbell	Hugh	MR	Merchant
Cresson	Elliot	MR	Merchant
Davis	Edward M.	MR	Merchant/Philanthr.
Garrett	Thomas C.	MR	Merchant/Importer
Green	Anthony	MR	Merchant
Guillou	Rene	MR	Merchant
Hacker	Jeremiah	MR	Merchant
Hill	Marshall	MR	Merchant
Hoskins	Francis	MR	Merchant
Julian	A.H.	MR	Merchant
Lesley	Joseph	MR	Merchant
Lewars	James E.	MR	Merchant
Lothrop	Z.	MR	Merchant
Nancrede	Thomas D.	MR	Merchant
Paul	Bettle	MR	Merchant
Price	Richard	MR	Merchant
Reed	Willoughby	MR	Merchant
Robins	Thomas	MR	Merchant
Scul	Alfred P.	MR	Merchant
Sharpless	Townsend	MR	Merchant
Sharpless	William P.	MR	Merchant, Dry Goods
Snider	Jacob Jr.	MR	Merchant
Sparhawk	Thomas P.	MR	Wine Merchant
Stokes	Samuel E.	MR	Merchant
Throckmorton	John W.	MR	Merchant
Whitall	John M.	MR	Merchant
White	Ambrose J.	MR	Merchant
Wolfe	E.D.	MR	Merchant
Agnew	William G.E.	MR	Merchant
Barnes	Albert	REV	Minister/Teacher
Goddard	Kingston	REV	Minister (Presb.)
Parker	Joel	REV	Minister (Episc.)
Potter	Alonzo	REV	Minister (Presb.)
Van Pelt	Peter	RTREV	Bishop of Penn.
Van Renssalaer	Cortlandt	REV	Minister (Episc.)
Glenn	L.W.	REV	Minister (Presb.)
Allibone	Samuel Austin	MR	Perfumer
Frost	John	ESQ	Writer/Merchant
Godey	Louis Antoine	PROF	Publisher
Hallowell	Morris L.	MR	Publisher
Maurice	William H.	MR	Silk & Fancy Goods
Biddle	Thomas A.	MR	Stationer
Charnley	William S.	MR	Stock Broker
		MR	Stock Broker

<u>Surname</u>	<u>Forenames</u>	<u>Title</u>	<u>Occupation</u>
Davis	Henry R.	MR	Stock Broker
Whelen	Edward S.	MR	Stock Broker
Brown	Benneville	MR	Tailor [?]
Coates	A.	MR	Tanner
Garrett	William E.	MR	Tobacconist
Stranaghan	James	MR	Trimmings
Cleveland	C.D.	PROF	Young Ladies' School
Campbell	Quintin	MR	Indefinite
Carr	Edward	MR	Indefinite
Cooper	John	MR	Indefinite
Martin	James	MR	Indefinite
Moore	John S.	MR	Indefinite
Bailey	James T.	MR	Unknown
Bovard	H.	MR	Unknown
Cressy	James	ESQ	Unknown
Hibbard	Edward	MR	Unknown
Morrison	Anna D.	MRS	Unknown
Ridgway	H.W.	MR	Unknown
Thomas		MRS	Unknown
Wharton		MISS	Unknown
Dock	Jacob	MR	Unlisted
Fullerton	Alex	MR	Unlisted
Garvin	William	MR	Unlisted
Gillingham	Mary	MRS	Unlisted
Hutton	A.B.	MR	Unlisted
Johnson	Lawrence	MR	Unlisted
Lejce	William R.	MR	Unlisted
Nathans	Nathan	ESQ	Unlisted
Negus	J. Engle	ESQ	Unlisted
Padelford	Mary	MISS	Unlisted
Small	James	MR	Unlisted
Smyth	Anne	MISS	Unlisted
Spafard	John	MR	Unlisted
Starr	Isaac	MR	Unlisted
Strathers	William	ESQ	Unlisted
Throckmorton	Edward	MR	Unlisted
Vanuxen	Henry	MR	Unlisted
Wetherill	R.P.	MISS	Unlisted
Wiggins	Emily	MISS	Unlisted

## BIBLIOGRAPHY

## Section A: Manuscript Sources

## (1) Locations of Manuscript Collections Consulted

	Location	Collection
AAS	American Antiquarian Society, Worcester, Massachusetts	Account Book of James Brown Syme, 1847-48, MSS Syme Diary of Caleb A. Wall, MSS Wall
	Beinecke Manuscript Library, Yale University, Connecticut	Sprague Papers
BOD	Bodleian Library, Oxford	Scrapbook of James Blackwood
DCA	Dundee Archive and Record Centre	Letters to and from Thomas Dick
	Dundee District Libraries	Lamb Collection
	Glasgow Observatory Archives, University of Glasgow	
	Houghton Library, Harvard Univ., Cambridge, Massachusetts	
NLS	National Library of Scotland	Letters to and from Thomas Dick
NLW	National Library of Wales	Album Compiled by Richard Parry
	New College Library, Edinburgh	Chalmers Papers
RAS	Royal Astronomical Society, London	Vallack Collection
	Schaffer Library, Union College, Schenectady, New York	Nott Papers
	Scottish Record Office	
	Stirling Central Regional Archives	Minutes of Stirling Associate Presbytery, pp. 516-35

## (2) Unpublished Theses

Baxter, Paul. *Science and Belief in Scotland, 1805-1868: The Scottish Evangelicals*. Ph.D. Thesis, Edinburgh University, 1985.

Gavine, David M. *Astronomy in Scotland 1745-1900*. Ph.D. Thesis, Open University, 1982.

Gelling, Anne Vivienne. *Middle-Class Women and the Ideology of Domestic Femininity, circa 1820-1860*. M. Litt., University of Oxford, 1989.

Hinton, D.A. *Popular Science in England, 1830-1870*. Ph.D. Thesis, University of Bath, 1979.

Hutt, Marten. *Medical Biography and Autobiography in Britain, c. 1780-1920*. D.Phil., University of Oxford, 1995.

Jones, Edward T. *The Theology of Thomas Dick and its Possible Relationship to that of Joseph Smith*. M.A. Thesis, Brigham Young University, 1969.

Kitteringham, Guy Stuart. *Studies in the Popularization of Science in England, 1800-30*. Ph.D. Thesis, Kent University, 1981.

Knickerbocker, Driss Richard. *The Popular Religious Tract in England, 1790-1830*. D.Phil. Thesis, University of Oxford, 1981.

McElligott, John Francis. *Before Darwin: Religion and Science as Presented in American Magazines, 1830-1860*. Ph.D. Thesis, New York University, 1973.

Schoepflin, Gary Lee. *Denison Olmsted (1791-1859), Scientist, Teacher, Christian: A Biographical Study of the Connection of Science with Religion in Antebellum America*. Ph.D. Thesis, Oregon State University, 1977.

Shoemaker, Philip S. *Stellar Impact: Ormsby MacKnight Mitchel and Astronomy in Antebellum America*. Ph.D. Thesis, University of Wisconsin-Madison, 1991.

Skinner, S.A. *The Social Thought of the Oxford Movement, with Specific Reference to the British Critic 1827-1843*. M.Phil. Thesis, University of Oxford, 1989.

Slocum, Stephen E. Jr. *The American Tract Society: 1825-1975. An Evangelical Effort to Influence the Religious and Moral Life of the United States*. Ph.D. Thesis, New York University, 1975.

Topham, Jonathan. *"An Infinite Variety of Arguments": The Bridgewater Treatises and British Natural Theology in the 1830s*. Ph.D. Thesis, Lancaster University, 1993.

Yule, John David. *The Impact of Science on British Religious Thought in the Second Quarter of the Nineteenth Century*. Ph.D. Thesis, University of Cambridge, 1976.

## Section B: Printed Sources

### (1) Primary Sources

#### (a) Works by Thomas Dick (arranged chronologically)

'Observations on the Celestial Bodies, made in the day-time; particularly on the Planet Venus, with some new Deductions in relation to that Planet', *A Journal of Natural Philosophy, Chemistry, and the Arts* [Nicholson's], 36 (Oct. 1813), 109-28.

'Mr Dick on the Visibility of Venus', *Monthly Magazine*, 37 (Feb. 1814), 18-19. ['On Literary and Philosophical Societies'], *Monthly Magazine*, 37 (Apr. and July 1814), 219-21, 507-10; 38 (Aug. and Sept. 1814/Jan. 1815), 23-5, 121-22, 503-06.

'Queries Respecting the Visibility of Stars in the Day-Time', *Annals of Philosophy*, 5 (1815), 466-68.

'Mr. Dick on the Surface of the Moon', *Monthly Magazine*, 38 (Aug. 1818), 18-20.

'Mr. Dick on the Names and Figures of the Constellations', *Monthly Magazine* 46 (Oct. 1818/Jan. 1819), 201-03; 500-02.

'Chemistry and Experimental Philosophy', *Monthly Magazine*, 50 (Aug. 1820), 62.

*The Christian Philosopher; or, the Connection of Science and Philosophy with Religion.* Tenth edition. Glasgow: William Collins, [1823], 1846.

'Remarks on Professor Hansteen's Account of a Shooting Star, seen in the day-time', *Edinburgh Philosophical Journal*, 13 (1825), 167-70.

*The Philosophy of Religion; or, an Illustration of the Moral Laws of the Universe.* Brookfield, Mass.: E. and G. Merriam, [1826], 1829.

'Description of a new Reflecting Telescope, denominated the Aërial Reflector', *Edinburgh New Philosophical Journal*, 1 (1826), 41-51.

*The Philosophy of a Future State.* Glasgow: William Collins, 1828.

*On the Improvement of Society by the Diffusion of Knowledge: or, an illustration of the advantages which would result from a more general dissemination of rational and scientific information among all ranks.* Edinburgh: Waugh and Innes, 1833.

'The Advantages of the Study of Astronomy', in Elijah Hinsdale Burritt, *The Geography of the Heavens, and Class-Book of Astronomy.* Accompanied by a Celestial Atlas. New York, [1833], 1855, pp. viii-xxiv.

Dick, Thomas, ed. *The Educational Magazine and Journal of Christian Philanthropy and of Public Utility.* Vols. 1-3. London, 1835-36.

*Christian Beneficence contrasted with Covetousness, illustrating the means by which the world may be regenerated.* London, 1836.

*On the Mental Illumination and Moral Improvement of Mankind; or, an inquiry into the means by which a general diffusion of knowledge and moral principle may be promoted.* New York: Robinson, Pratt & Co., 1836.

*Dundee, Perth and Cupar Advertiser.* [Series of twenty-four articles describing celestial phenomena and giving monthly aspects of the sky, 1836-40].

*Celestial Scenery; or, the Wonders of the Planetary System Displayed: Illustrating the Perfections of Deity and a Plurality of Worlds.* Philadelphia: E.C. & J. Biddle, [1837], 1845.

'The Rings of Saturn', *Knickerbocker Magazine* 11 (Feb. 1838), 89-96, reprinted in *The New Yorker*, 4 (Feb. 1838), 738-40.

*The Christian Philosopher; or, the Connection of Science and Philosophy with Religion.* Abridged by Rev. H.D. Gossling. New York: T. Mason and G. Lane, for the Methodist Episcopal Church, 1839.

'An Idea of the Universe', *Littell's Museum of Foreign Literature*, 38 (Feb. 1840), 193-99, reprinted in *The Literary Emporium*, 1 (Feb. 1845), 44-52.

*The Sidereal Heavens, and other subjects connected with Astronomy, as illustrative of the character of the Deity and of an infinity of worlds.* Philadelphia: E.C. & J. Biddle, [1840], 1845.

*Discoveries of Modern Geology not Inconsistent with Revelation.* Being the sixth of a series of lectures to young men, delivered in Broughton Place Church, by clergymen of various evangelical denominations, at request of the Edinburgh Young Men's Society. Edinburgh: Q. Dalrymple, 1842.

*Harmony of the Discoveries of Modern Science with Revealed Religion.* Being the seventh of a series of lectures to young men, delivered in Broughton Place Church. Edinburgh: Q. Dalrymple, 1842.

'On Comets', in Arago, François Jean, *The Comet...* to which is added a full account of the extraordinary comet now blazing forth through the heavens; together with the opinions of Herschel, Dick, Somerville and others in relation to the physical constitution and influence of comets on the earth. Translated by C. Gold. New York: J. Winchester, 1843.

'Observations on the Planet Venus at the time of its superior conjunction', *Edinburgh New Philosophical Journal*, 36 (1844), 164-67.

*The Practical Astronomer, comprising illustrations of light and colours - practical descriptions of all kinds of telescopes - the use of the equatorial transit - circular, and other astronomical instruments, a particular account of the Earl of Rosse's large telescopes, and other topics connected with astronomy.* London: Seeley, Burnside and Seeley, 1845.

*The Solar System, with moral and religious reflections in reference to the wonders therein displayed.* London: Religious Tract Society, 1846.

*The Atmosphere and Atmospheric Phenomena.* London: Religious Tract Society, 1848.

*Die Wunder des Himmels. Dargestellt zur Verherrlichung der Vollkommenheiten Gottes und zur Aufklärung über eine Mehrheit von Welten...* Aus dem Englischen von F.V. Eichstrom, hauptmann der R. Württemb. Artillerie. Neuer Abdruck. Stuttgart: Rieger'sche Verlagssbuchhandlung, 1850.

*The Telescope and Microscope.* London: Religious Tract Society, 1851.

*The Christian's Hope: A Sermon.* Glasgow: John Thomas, 1851.

*The Diffusion of Knowledge.* Being the First of a Course of Lectures to Young Men, in connection with the Dundee Literary Societies' Union, delivered in Free St Paul's Church, Reform Street, 17th November, 1851. Dundee: Frederick



Shaw, 1851.

'On Celestial Day Observations', *Monthly Notices of the Royal Astronomical Society*, 15 (11 May 1855), 222-23.

(b) Library Catalogues (arranged chronologically and grouped by country)

(1) In America

A Catalogue of the Library of the Middlesex Mechanic Association, at Lowell, Mass. Lowell, 1840, 1846.

Catalogue of Books of the Mechanic Apprentices' Library Association. Boston, 1847.

Catalogue of the Westboro' Mechanic Association's Library. Westboro, Mass., 1848.

Catalogue of the Library, of the Newport Association of Mechanics and Manufacturers. Newport, Rhode Island, 1850.

A Catalogue of the Mercantile Library Company of Philadelphia. Philadelphia, 1850.

Catalogue of the Salem Mechanic Library. Salem, Mass., 1851.

Catalogue of the Calvinist Sabbath School Library, Worcester. Worcester, 1854.

Catalogue of the Mercantile Library of Boston. Boston, 1854.

Catalogue of the San Francisco Mercantile Library. San Francisco, 1854.

Catalogue of the Printers' Free Library, under the Direction of the New York Typographical Society. New York, 1855.

Catalogue of the Young Men's Mercantile Library Association, of Cincinnati. Cincinnati, 1855.

Catalogue of Books in the Sabbath School Library of the Park Street Methodist Episcopal Church, Worcester. Boston, 1857.

Catalogue of the Calvinistic Congregational Sabbath School Library in Fitchburg. Fitchburg, Mass., 1857.

Catalogue of the Library of the Worcester County Mechanics Association. Worcester, Mass., 1857.

Johnson, E.W. Catalogue Systematic and Analytical of the Books of the Saint Louis Mercantile Library Association. St. Louis, 1858.

Catalogue of Books in the Mercantile Library, of the City of New York. New York, 1866.

Catalogue of the Mechanics and Apprentices' Library, established by the Providence Association of Mechanics and Manufacturers. Providence, 1866.

Catalogue of the Mechanics' Institute Library of San Francisco. San Francisco, 1867.

Catalogue of the Brooklyn Mercantile Library. 3 vols. Brooklyn, New York, 1877-80.

Catalogue of the Evangelical Sunday School Library of Westboro. Westboro, Mass., 1888.

Catalogue of the Books of the Library of the Maine Charitable Mechanic Association, founded July, 1820. Portland, Maine, 1900.

## (2) In Britain

A Catalogue of the Library of the Banbury Mechanics' Institution, with the Bye-Laws for the Regulation of the Library. Banbury, 1836.

A Catalogue of the Lyceum Library, at Kingston-upon-Hull. Hull, 1836.

Catalogue of Books in the Library of the Hull Mechanics' Institute. Hull, 1839.

Laws of the Lewes Mechanics' Institution, for the Promotion of Useful Knowledge among the Working Classes. Established November, 1825. With the Regulations adopted by the Committee of Management, and Catalogue of its Library. Hailsham, 1839.

Catalogue of James Nisbet's Select Theological Circulating Library. [With] Appendix. London, 1832, 1841.

The Arranged Catalogue of the Library of the Mechanics' Institute, or Literary and Scientific Society of the Borough of Gateshead. Gateshead, 1842.

Catalogue of New and Standard Works, in Circulation at Mudie's Select Library. London, 1861.

Birch, A.J., ed. Great Western Railway Mechanics' Institution, New Swindon. Catalogue of Books. Swindon, 1888.

## (c) Other Primary Sources

Adams, John Quincy. An Oration, delivered before the Cincinnati Astronomical Society, on the Occasion of Laying the Corner Stone of an Astronomical Observatory. Cincinnati, 1843.

[A.L.]. 'The Case of Dr. Dick', Pennsylvania Inquirer, 35 (15 Jan. 1850), no. 7, p. 4, c. 1-2.

ANON. 'The Argument for Natural Religion', Christian Examiner, 19 (1835-6),

137-63.

ANON. 'The British Association', *The Free Church Magazine*, 8 (1850), 257-61.

ANON. 'Chapters on the Sciences. Astronomy', *Lowell Offering: A Repository of Original Articles, written by Females Employed in the Mills*, 2 (1842), 225-36.

ANON. 'A Child', *American Magazine of Useful Knowledge*, 2 (1835), 22.

ANON. 'Christian Philosopher', *Eclectic Review*, new series, 21 (May 1824), 432-34.

ANON. 'Combe's Reply to Kennedy's "Nature and Revelation Harmonious"', *United Presbyterian Magazine*, 2 (1848), 64-68.

ANON. 'Comets and Eclipses', *Knickerbocker*, 7 (Mar. 1836), 262-65.

ANON. 'Dick, "on the Moral Improvement of Mankind"', *The British Critic, Quarterly Theological Review, and Ecclesiastical Record*, 19 (1836), 90-9.

ANON. 'Divine Agency in the Material Universe', *The Christian Examiner, and General Review*, 18 (1835), 314-27.

ANON. 'Dr. Thomas Dick', *The Dollar Newspaper* [Philadelphia], (20 Feb. 1850), c. 7.

ANON. 'Dr. Thomas Dick. The Timely Tribute--Its Grateful Reception', *M'Makins Model American Courier*, 20 (18 May 1850), no. 11, p. 2, c. 4.

ANON. 'Friends of Dr Dick', *The Saturday Gazette* [Philadelphia], 11 (23 Feb. 1850), p. 3, c. 3.

ANON. 'General Improvement of Society', *Quarterly Christian Spectator*, 6 (1834), 632-54.

ANON. *The Infant Reader. Or Easy Lessons in Reading for Little Boys and Girls.* Philadelphia: Presbyterian Board of Publication, 1850.

ANON. *The Juvenile Philosopher; or Youth's Manual of Philosophy.* 2nd rev. edition. Geneva, New York, 1826.

ANON. 'Mr. Dick, on Science and Religion', *Scots Mechanics' Magazine*, 1 (1825), 130-34.

ANON. 'Miscellanea' [Johnson Jex], *The Athenaeum* (24 Jan. 1852), 123-24.

ANON. 'Obituary: Thomas Dick', *Saco Maine Democrat*, 29 (25 Aug. 1857), no. 4, p. 2, c. 7, reprinted from the *Boston Journal*, n.d.

ANON. 'Probability of the Planets being Inhabited', *Atkinson's Casket*, 8 (Aug. 1832), 338-40.

ANON. 'Real Life. Genius and Misfortune. The Poor Author', *Pennsylvania Inquirer* [Philadelphia], 35 (12 Jan. 1850), no. 6, p. 4, c. 1-2.

ANON. *Real Stories of Real Children. Designed for Infant Schools, and small children in families. Part 1.* Boston, 1833.

ANON. 'Relief for the "Christian Philosopher"', *M'Makins Model American Courier*, 19 (19 Jan. 1850), no. 46, p. 2, c. 5.

ANON. 'Review: The Christian Philosopher', *Christian Examiner*, 5 (1828), 14-15.

ANON. 'Review of Butler's Analogy of Natural and Revealed Religion', *Quarterly Christian Spectator*, 2 (new ser., 1830), 694-719.

ANON. 'Review of Campbell and Dick on Education', *Edinburgh Christian Instructor*, 23 (May 1824), 325-41.

ANON. 'Review of Derham's Physico Theology', *Quarterly Christian Spectator*, 3 (1831), 441-53.

ANON. 'Review of Dick's Celestial Scenery', *Godey's Lady's Book*, 16 (Jun. 1838), 285-86.

ANON. 'Review of Dick's "Christian Philosopher"', *Wesleyan Methodist Magazine*, 3rd series, 3 (1824), 33-40.

ANON. 'Review of Dick's Improvement of Society', *Evangelical Magazine*, new Series, 11 (1833), 309-10.

ANON. 'Review of Lord Brougham's Discourse on Natural Theology', *Christian Observer*, 35 (1835), 687-99, 738-50, 804-19.

ANON. 'Review of Mental Illumination', *Hartford Watchman*, no. 11, 14 Mar. 1836, p. 44.

ANON. 'Review of Mental Illumination', *Waldie's Journal of Belles Lettres*, 9 (1 Mar. 1836), part 1, n.p.

ANON. 'Scripture and Geology--Are they ever Discordant?', *The Free Church Magazine*, 5 (Apr. 1848), 104-07.

ANON. 'Short Notices: The Christian Philosopher', *Princeton Review*, 29 (new ser., 1857), 547.

ANON. 'The Testimonial to Dr. Dick', *Pennsylvania Inquirer*, 42 (8 May 1850), no. 111, p. 2, c. 1.

ANON. 'Thomas Dick and Eugene Sue', *Philadelphia Press*, 1 (19 Aug. 1857), no. 16, p.1, c.3.

ANON. 'The Unseen Universe', *Nature*, 12 (20 May 1875), 41-3.

ANON. *What is a Star?*. New York: American Tract Society, n.d. but before 1851.

[Astro-Theologus]. *The Evangelical Almanack: or, Religious Monitor*. Albany: Printed and Published by E. & E. Hosford, 1822-26.

Baxter, Andrew. *Matho: or, the Cosmotheoria Puerilis, A Dialogue*. In which the first principles of philosophy and astronomy are accomodated to the capacity of young persons, or such as have yet no tincture of these sciences. Hence the principles of natural religion are deduced. London, 1740.

Bartlett, Montgomery Robert. *Young Ladies' Astronomy. A Concise System of Physical, Practical, and Descriptive Astronomy: Designed Particularly for the Assistance of Young Ladies, in that Interesting and Sublime Study; though well adapted to the use of Common Schools*. Utica, New York, 1825.

Blake, John L. *First Book in Astronomy, adapted to the use of Common Schools*. Boston, 1831.

Bradford, Duncan. *The Wonders of the Heavens, being a Popular View of Astronomy*. Boston, 1837.

Brewster, David. *More Worlds than One; the creed of the philosophical and the hope of the Christian*. London, 1854.

Brougham, Henry. *Practical Observations upon the Education of the People, addressed to the Working Classes and their Employers*. London, 1825.

Brougham, Henry. *A Discourse of Natural Theology*. London, 1835.

Brown, Joseph and Charles S. Francis. *Catalogue of Philosophical and Astronomical Apparatus*. New York, 1836.

Bryan, Margaret. *A Compendious System of Astronomy, in a course of familiar lectures*. London, 1797.

Burnap, Uzziah C. *The Youth's Ethereal Director; or a concise and familiar explanation of the elements of astronomy*. Middlebury, Vermont, 1822.

Burr, Enoch Fitch. *Ecce Coelum; or, Parish Astronomy*. Boston: Cornhill Press, 1867.

Butler, Joseph. *The Analogy of Religion Natural & Revealed to the Constitution and Course of Nature*. London, 1736, 1900.

[C.]. 'Remarks on Mr. S. Turner's "Sacred History of the World"', *The Christian Lady's Magazine*, 4 (1835), 497-502.

Chalmers, Thomas. *A Series of Discourses on the Christian Revelation, viewed in Connection with the Modern Astronomy*. Glasgow, 1817.

Chalmers, Thomas. *On the Power Wisdom and Goodness of God as Manifested in the Adaptation of External Nature to the Moral and Intellectual Constitution of Man*. 2 vols. London: William Pickering, 1833, 1839.

Chambers, Robert. *Vestiges of the Natural History of Creation and Other Evolutionary Writings*. Edited, with an Introduction by James A. Secord. Chicago: University of Chicago Press, [1844], 1994.

Clark, Alvah. *A New System of Astronomy, in Question and Answer, for the Use of Schools and Academies*. New York, 1820.

Combe, George. *On the Relation between Religion and Science*. Edinburgh, 1847.

[A Correspondent], 'A Lancashire Geologist', *Manchester Guardian* (16 Jan. 1883), p. 6, c. 4.

Courtenay, James. *An Inquiry into the Propriety of Establishing a National Observatory*. Charleston, 1827.

Cumming, John. *God in Science*. A Lecture by Rev. John Cumming, D.D., delivered before the Young Men's Christian Association, in Exeter Hall, Jan. 7, 1851. New York, 1852.

Davy, Sir Humphry. *Consolations in Travel, or the Last Days of a Philosopher*. London: John Murray, 1830.

De Vere, Maximilian Schele. *Stray Leaves from the Book of Nature...* with a preface by T. Dick. London, 1856.

Drew, John. *Manual of Astronomy: A Popular Treatise on Descriptive, Physical, and Practical Astronomy*. London, 1845.

Duncan, Henry. *The Young South Country Weaver; or, A Journey to Glasgow: A Tale for the Radicals*. 2nd ed. Edinburgh, 1821.

Duppa, Baldwin F. *A Manual for Mechanics' Institutes*. London, 1839.

Dwight, Timothy. *Theology Explained and Defended*. 2 vols. New Haven, Conn., 1836.

Edward [pseud.]. *Aunt Fanny's Home, and her Talks about God's Works*. Philadelphia: Presbyterian Board of Education, 1863.

Egelmann, Charles F. *The Citizens' and Farmers' Almanac, for the Year of our Lord 1832*. Baltimore, 1831.

Ellis, Sarah. *The Daughters of England, their Position in Society, Character & Responsibilities*. London, 1842.

Emerson, Joseph. *Outline of a Course of Astronomical Lectures*. Boston, 1819.

*The English Catalogue of Books, 1801-1836*. Ed. R.A. Peddie. London, 1914.

*The English Catalogue of Books Published from January, 1835, to January, 1863*. London, 1864.

Everett, Edward. 'Uses of Astronomy', *American Journal of Education*, 2 (1856), 606-28.

Gaskell, Elizabeth. *Mary Barton: A Tale of Manchester Life*. 1848. Reprint London: Penguin Books, 1994.

Goodrich, Samuel G. *A Glance at the Physical Sciences; or the Wonders of Nature*. Boston, 1849.

Grant, James. *The Great Metropolis*. 2nd series. 2 vols. London, 1837.

Griggs, William N. *The Celebrated 'Moon Story', its Origins and Incidents; with a memoir of the author.* New York, 1852.

Gutteridge, Joseph. *Lights and Shadows in the Life of an Artisan*, by Joseph Gutteridge, Ribbon Weaver. Coventry: Curtis and Beamish, 1893.

[H.]. 'Warfare of Misguided Zeal upon Science', *Knickerbocker*, 8 (1836), 666-74.

Hall, Frederick. *An Oration, on the Importance of Cultivating the Sciences.* 1828.

Higginson, Edward. *Astro-Theology; or, The Religion of Astronomy: Four Lectures, in reference to the controversy on the "Plurality of Worlds," as lately sustained between Sir David Brewster and an essayist.* London: E.T. Whitfield, 1855.

Hitchcock, Edward. *Elementary Geology.* New edition. New York, 1847.

Hitchcock, Edward. *Religious Truth, Illustrated from Science, in addresses and sermons on special occasions.* Boston, 1857.

Hole, James. *An Essay on the History and Management of Literary, Scientific, & Mechanics' Institutions.* London, 1853.

Hopkins, Mark. *Science and Religion. A Sermon delivered in the Second Presbyterian Church, Albany, on Sabbath Afternoon, August 24, 1856.* Albany, 1856.

Jacob, William S. *A Few More Words on the Plurality of Worlds.* London: Bell and Daldy, 1855.

Jones, William. *The Jubilee Memorial of the Religious Tract Society: containing a record of its origin, proceedings, and results.* London: Religious Tract Society, 1850.

Kirby, William. *On the History, Habits and Instincts of Animals.* 2 vols. London, 1835.

Langdon, Roger. *The Life of Roger Langdon, Told by Himself.* London, 1909.

'Letter from Dr. Dick', *The Saco Democrat*, 21 (5 Mar. 1850), no. 30, p. 3, c.1.

Lewis, Prof. [Tayler?]. 'Study of the Heavens', *The Iris, or Literary Messenger*, 1 (Jan. 1841), 127-35.

Livingston, Peter. *Poems and Songs; with lectures on the genius & works of Burns, and the Rev. George Gilfillan; and letters on Dr Dick, the Christian philosopher, and Sir John Franklin and the Arctic regions.* Dundee: J. Pellow, 1867.

Livingstone, David. *Travels and Researches in South Africa.* London, 1857, 1905.

Lowrie, W.F. 'Deity and Nature', *Ladies' Repository*, 1 (1841), 268-72.

Mackie, Charles. *Historical Description of the Town of Dundee*. Glasgow, 1836.

Mackintosh, David. *Supplement to the Bridgewater Treatises. The Highest Generalizations in Geology and Astronomy, viewed as illustrating the Greatness of the Creator*. 2nd ed. London, 1843.

Marks, F. *A Brief Survey of the Moral State of the World; or, an Examination of the General Train of Human Actions, in reference to their conformity with the will of divine law of the ruler of the universe; together with the happy effects which would flow from the full operation of the principle of love to God and to man. Extracted from the writings of Thomas Dick, and others*. Geneva, New York: James Bogert, 1832.

Martin, William. *The Defeat of the Noted Impostor MacIntosh, the False Astronomer and Geologist*. Newcastle, 1842.

Maxwell, Charles C. *A Historical and Descriptive Guide to Dundee*. Dundee, 1858.

Miller, Hugh. *The Testimony of the Rocks; or, Geology in its Bearings on the Two Theologies, Natural and Revealed*. Boston: Gould and Lincoln, 1857.

Milner, Thomas. *The Gallery of Nature; or Wonders of the Earth and the Heavens*. 2 vols. Boston, 1857.

Mitchel, Ormsby MacKnight. *The Sidereal Messenger, a Monthly Journal, devoted to Astronomical Science*. Vols. 1-3. Cincinnati, 1846-48.

Mitchel, Ormsby MacKnight. *An Address, delivered at the dedication of the Astronomical Observatory of Hamilton College, July 16, 1856*. Utica, New York, 1856.

Mortimer, Favell. *The Peep of Day; or, A Series of the Earliest Religious Instruction the Infant Mind is Capable of Receiving*. New York: American Tract Society, c. 1848.

Mudie, Robert. *The Modern Athens: A Dissection and Demonstration of Men and Things in the Scotch Capital*. London, 1825.

Myles, James. *Chapters in the Life of a Dundee Factory Boy; an Autobiography*. Dundee, 1850.

Olmsted, Denison. 'The Christian Philosopher', *Christian Spectator*, 9 (1827), 149-61.

Olmsted, Denison. *Letters on Astronomy, Addressed to a Lady*. Boston, 1841.

Paley, William. *Natural Theology; or Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature*. 2 vols. Oxford, 1826.

Paley, William. *Natural Theology; or Evidences of the Existence and Attributes of the Deity, with Illustrative Notes and Dissertations by Henry Lord Brougham, F.R.S., & Sir C. Bell, K.G.H.F.R.S.* London, 1836



- Parsons, Benjamin. *The Mental and Moral Dignity of Woman*. London, 1842.
- Parsons, Benjamin. *Education, the Birthright of every Human Being, and the only Scriptural Preparation for the Millennium*. London, 1845.
- Pettengill, Amos. *A View of the Heavens, or Familiar Lessons on Astronomy*. New Haven, 1826.
- Pierpoint, John. *On the Moral Influences of Physical Science*. Boston, 1833.
- Pike, Benjamin Jr. *Pike's Illustrated Descriptive Catalogue of Optical, Mathematical, and Philosophical Instruments*. New York: 1856; Dracut, Mass.: Arno Press, 1984, with introduction by Deborah Jean Warner.
- Poinsett, Joel R. *Discourse, on the Objects and Importance of the National Institution for the Promotion of Science*. Washington, 1841.
- Proctor, Richard Anthony. *Other Worlds than Ours: the Plurality of Worlds Studied under the Light of Recent Scientific Researches*. New York: Fowle, 1870.
- Rafinesque, Constantine S. *Celestial Wonders, and Philosophy*. Philadelphia, 1838.
- Roberts, Robert. *A Wandering Scholar: The Life and Opinions of Robert Roberts*. Introduction by John Burnett and H.G. Williams. Cardiff: University of Wales Press, 1991.
- Rogers, W.M. 'Pleasures of Science', in *Scientific Tracts*. Boston, 1836, pp. 145-60.
- Shaw, Charles. *When I Was a Child, by an Old Potter*. London, 1903.
- Sir David Brewster: *His Last Days and Death*. Remarks by Professor Lyon Playfair, Sir James Y. Simpson, and Mr David Stevenson, at the Meeting of the Royal Society of Edinburgh, on the 17th February 1868. Edinburgh, 1868.
- Small, Robert. *The History of Dundee*. Dundee, 1793, 1842.
- Smiles, Samuel. *Men of Invention and Industry*. London, 1884.
- Smith, Mary. *The Autobiography of Mary Smith, Schoolmistress and Nonconformist*. London, 1892.
- [Society of Clergymen]. 'Natural Theology', *Bibliotheca Sacra*, 3 (1846), 241-84.
- Sprague, William B. *Visits to European Celebrities*. Boston, 1855.
- Stodart, Mary Anne. *Hints on Reading: Addressed to a Young Lady*. London, 1839.
- Thomson, Andrew. 'Connexion between the Discoveries of Science and True Religion, and the manner in which they illustrate each other', in *Four Lectures to Young Men; delivered at the Request of the Edinburgh Young Mens' Society*. Edinburgh: William Innes, 1842.

- Thomson, Christopher. *The Autobiography of an Artisan*. London, 1847.
- Thomson, James. *The History of Dundee*. New and Enlarged edition, revised by James MacLaren. Dundee, 1847, 1874.
- Thomson, Thomas. 'Sketch of the Improvements in Science Made during the Year 1813', *Annals of Philosophy*, 3 (1814), 1-32.
- Traice, W.H.J. *Hand-book of Mechanics' Institutes, with Priced Catalogue of Books Suitable for Libraries*. London, 1856; 2d. ed., rev., 1863.
- Webb, Thomas William. *Celestial Objects for Common Telescopes*. London, 1859.
- Whewell, William. *Astronomy and General Physics Considered with Reference to Natural Theology*. London, 1834.
- Whewell, William. *Plurality of Worlds*. Introduction by Edward Hitchcock. Boston, 1854.
- Whewell, William. *A Dialogue on the Plurality of Worlds; being a supplement to the essay on that subject*. London, 1853.
- Wilbur, Hervey. *Elements of Astronomy, Descriptive and Physical*. New Haven, 1830.
- Wilkins, John. *The Discovery of a World in the Moone*. London, 1638; reprinted New York, with introduction by Barbara Shapiro, 1973.
- Wright, Thomas. *Universe and the Stars*. With notes by Constantine Rafinesque. Philadelphia, 1837.
- Youmans, E.L. *The Culture Demanded by Modern Life*. New York, 1867.
- Young, David. *Lectures on the Science of Astronomy, Explanatory and Demonstrative*. Morris-Town, New Jersey, 1821.

## (2) Secondary Sources

- Addinall, Peter. *Philosophy and Biblical Interpretation: A Study in Nineteenth-century Conflict*. Cambridge: Cambridge University Press, 1991.
- Allen, David Elliston. *The Naturalist in Britain: A Social History*. London: Allen Lane, 1976.
- Allen, David Elliston. 'Natural History and Social History', *Journal of the Society for the Bibliography of Natural History*, 7 (1976), 509-16.
- Allibone, Samuel Austin. *A Critical Dictionary of English Literature and British and American Authors*. 3 vols. Philadelphia, 1877.
- Alterton, Margaret. *Origins of Poe's Critical Theory*. Iowa City: University of Iowa Press, 1925.
- Altholz, Josef L. *The Religious Periodical Press in Britain, 1760-1900*. London: Greenwood Press, 1989.
- Altick, Richard D. *The English Common Reader: A Social History of the Mass Reading Public 1800-1900*. Chicago: University of Chicago Press, 1957.
- Altick, Richard D. *Victorian People and Ideas*. London: J.M. Dent & Sons Ltd, 1973.
- Altick, Richard D. 'Nineteenth-century English Best-sellers: A Further List', *Studies in Bibliography*, 22 (1969), 197-206.
- Altick, Richard D. 'Nineteenth-century English Best-sellers: A Third List', *Studies in Bibliography*, 39 (1986), 235-41.
- Anderson, Robert David. *Education and Opportunity in Victorian Scotland: Schools and Universities*. Oxford: Clarendon Press, 1983.
- Anderson, Robert David. 'Secondary Schools and Scottish Society in the Nineteenth Century', *Past and Present*, 109 (1985), 176-203.
- Anderson, William. *The Scottish Nation*. 3 vols. Edinburgh, 1866-77.
- ANON., 'Dick, Thomas, LL.D.', in *Men of the Time. Biographical Sketches of Eminent Living Characters*. London, 1856.
- ANON. 'The House of Seeley', *The Bookman*, 26 (1904), 13-17.
- ANON. 'Portrait Gallery. Thomas Dick, LL.D.', *Hogg's Instructor* (27 April 1850), 145-47.
- ANON. *The Story of the Religious Tract Society*. London, 1898.
- ANON., 'Thomas Dick, LL.D.', *Littell's Living Age*, 61 (16 Apr. 1859), 131-36.
- Bailey, Peter. *Leisure and Class in Victorian England: Rational Recreation and the Contest for Control, 1830-1885*. London: Routledge and Kegan Paul, 1978.

- Barber, Lynn. *The Heyday of Natural History 1820-1870*. Garden City, New York: Doubleday & Company, Inc., 1980.
- Baxter, Paul. 'Deism and Development: Disruptive Forces in Scottish Natural Theology', in Stewart J. Brown and Michael Fry, eds., *Scotland in the Age of Disruption*. Edinburgh: Edinburgh University Press, 1993, pp. 98-112.
- Beaver, Donald de B. 'Altruism, Patriotism, and Science: Scientific Journals in the Early Republic', *American Studies*, 12 (1971), 5-19.
- Beaver, Harold, ed. *The Science Fiction of Edgar Allan Poe*. London: Penguin Books, 1976.
- Beaver, Joseph. *Walt Whitman--Poet of Science*. Morningside Heights, New York: King's Crown Press, 1951.
- Bebbington, David W. *Evangelicalism in Modern Britain: A History from the 1730s to the 1980s*. London: Unwin Hyman, 1989.
- Bedini, Silvio A. *Early American Scientific Instruments and their Makers*. Washington: Smithsonian, 1964.
- Bedini, Silvio A. *Thinkers and Tinkers: Early American Men of Science*. New York: Scribners, 1975.
- Bender, Thomas. 'Science and the Culture of American Communities: The Nineteenth Century', *History of Education Quarterly*, 16 (1976), 63-77.
- Benjamin, Marina. 'Elbow Room: Women Writers on Science, 1790-1840', in Marina Benjamin, ed., *Science and Sensibility: Gender and Scientific Enquiry, 1780-1945*. Oxford: Blackwell, 1991, pp. 27-59.
- Benton, Richard P., ed. *Poe as Literary Cosmologer: Studies on Eureka*. A Symposium. Hartford: Transcendental Books, 1975.
- Berg, Maxine. *The Machinery Question and the Making of Political Economy 1815-1848*. Cambridge: Cambridge University Press, 1980.
- Berman, Morris. '"Hegemony" and the Amateur Tradition in British Science', *Journal of Social History*, 8 (1974), 30-50.
- Best, Geoffrey. 'The Evangelicals and the Established Church in the Early Nineteenth Century', *Journal of Theological Studies*, 10 (1959), 63-78.
- Blaisdell, Muriel. 'Natural Theology and Nature's Disguises', *Journal of the History of Biology*, 15 (1982), 163-89.
- Boylan, Anne. 'The Role of Conversion in Nineteenth-century Sunday Schools', *American Studies*, 20 (Spring 1979), 35-48.
- Boylan, Anne. 'Sunday Schools and Changing Evangelical Views of Children in the 1820s', *Church History*, 48 (Sept. 1979), 320-33.
- Bozeman, Theodore Dwight. *Protestants in an Age of Science: The Baconian Ideal and Antebellum American Religious Thought*. Chapel Hill: University of North Carolina Press, 1977.

Bradley, Ian. *The Call to Seriousness: The Evangelical Impact on the Victorians*. London: Jonathan Cape, 1976.

Brashear, John A. 'A Visit to the Home of Dr. Thomas Dick: The Christian Philosopher and Astronomer', *Journal of the Royal Astronomical Society of Canada*, 7 (1913), 19-30.

Brashear, John A. *A Man Who Loved the Stars: The Autobiography of John A. Brashear*. Pittsburgh: University of Pittsburgh Press, 1924, 1988.

Briggs, Asa. 'Samuel Smiles and the Gospel of Work', in *Victorian People: A Reassessment of Persons and Themes 1851-67*. Harmondsworth: Penguin, 1971, pp. 124-47.

Briggs, Asa. *The Age of Improvement, 1783-1867*. London: Longmans, 1959.

Brock, Peter. *Radical Pacifists in Antebellum America*. Princeton: Princeton University Press, 1968.

Brock, William H. 'British Science Periodicals and Culture: 1820-1850', *Victorian Periodicals Review*, 21 (1988), 47-55.

Brock, William H. 'Notes and Discussions. Humboldt and the British: A Note on the Character of British Science', *Annals of Science*, 50 (1993), 365-72.

Brodie, Fawn M. *No Man Knows My History: The Life of Joseph Smith, the Mormon Prophet*. New York: Alfred A. Knopf, 1945.

Brooke, John Hedley. 'Natural Theology in Britain from Boyle to Paley', in Brooke and R. Hooykaas, *New Interactions between Theology and Natural Science*. Milton Keynes: Open University Press, 1974, pp. 5-54.

Brooke, John Hedley. 'Natural Theology and the Plurality of Worlds: Observations on the Brewster-Whewell Debate', *Annals of Science*, 34 (1977), 221-86.

Brooke, John Hedley. 'Nebular Contraction and the Expansion of Naturalism', *British Journal for the History of Science*, 12 (1979), 200-11.

Brooke, John Hedley. 'The Natural Theology of Geologists: Some Theological Strata', in L.J. Jordanova and Roy S. Porter, eds., *Images of the Earth: Essays in the History of the Environmental Sciences*. Chalfont St Giles: BSHS, 1979, pp. 39-66.

Brooke, John Hedley. 'Why did the English Mix their Science and their Religion?', in S. Rossi, ed., *Science and Imagination in Eighteenth-Century British Culture*. Milan: Edizioni Unicopli, 1987, pp. 57-78.

Brooke, John Hedley. 'The God of Isaac Newton', in John Fauvel et al., eds., *Let Newton Be! A New Perspective on His Life and Works*. Oxford: Oxford University Press, 1988, pp. 168-83.

Brooke, John Hedley. 'Science and the Fortunes of Natural Theology: Some Historical Perspectives', *Zygon*, 24 (1989), 3-22.

- Brooke, John Hedley. 'Science and the Secularisation of Knowledge: Perspectives on some 19th Century Transformations', *Nuncius: Annali di Storia della Scienza*, 4 (1989), 43-65.
- Brooke, John Hedley. *Science and Religion: Some Historical Perspectives*. Cambridge: Cambridge University Press, 1991.
- Brown, Callum G. *The Social History of Religion in Scotland since 1730*. London: Methuen, 1987.
- Brown, Richard. *Church and State in Modern Britain 1700-1850*. London: Routledge, 1991.
- Brown, Richard D. *Knowledge is Power: The Diffusion of Information in Early America, 1700-1865*. Oxford: Oxford University Press, 1989.
- Brown, Stewart J. *Thomas Chalmers and the Godly Commonwealth in Scotland*. Oxford: Oxford University Press, 1982.
- Brown, Stewart J. 'Reform, Reconstruction, Reaction: The Social Vision of Scottish Presbyterianism c.1830-c.1930', *Scottish Journal of Theology*, 44 (1991), 489-517.
- Bruce, Robert V. *The Launching of Modern American Science 1846-1876*. Ithaca, New York: Cornell University Press, 1987.
- Brush, Stephen G. 'Looking Up: The Rise of Astronomy in America', *American Studies*, 20 (1979), 41-67.
- Brush, Stephen G. 'The Nebular Hypothesis and the Evolutionary Worldview', *History of Science*, 25 (1987), 245-78.
- Burgess, Renate. *Portraits of Doctors & Scientists in the Wellcome Institute of the History of Medicine, A Catalogue*. London, 1973.
- Burke, John G. 'Kirk and Causality in Edinburgh, 1805', *Isis*, 61 (1970), 340-54.
- Burnett, John and David Vincent and David Mayall, eds., *The Autobiography of the Working Class: An Annotated, Critical Bibliography. Volume I: 1790-1900*. Brighton, Sussex: Harvester Press Limited, 1984.
- Burnett, John, ed. *Destiny Obscure: Autobiographies of Childhood, Education and Family from the 1820s to the 1920s*. London: Routledge, 1982, 1994.
- Burnett, John. *Idle Hands: The Experience of Unemployment, 1790-1990*. London: Routledge, 1994.
- Burnett, John. *Useful Toil: Autobiographies of Working People from the 1820s to the 1920s*. London: Routledge, 1974, 1994.
- Burnham, John C. *How Superstition Won and Science Lost: Popularizing Science and Health in the United States*. New Brunswick: Rutgers University Press, 1987.

- Cable, John A. 'The Early History of Scottish Popular Science', *Studies in Adult Education*, 4 (1972), 34-45.
- Cairns, David. 'Thomas Chalmers's Astronomical Discourses: A Study in Natural Theology', *Scottish Journal of Theology*, 9 (1956), 410-21.
- Cameron, Nigel et al., eds. *Dictionary of Scottish Church History and Theology*. Edinburgh: T&T Clark, 1993.
- Campbell, Roy H. and Skinner, Andrew S. *The Origins and Nature of the Scottish Enlightenment*. Edinburgh: John Donald, 1982.
- Cannon, Susan Faye. *Science in Culture: The Early Victorian Period*. New York: Science History Publications, 1978.
- Cannon, Walter Faye. 'The Problem of Miracles in the 1830's', *Victorian Studies*, 4 (1960), 5-32.
- Cannon, Walter Faye. 'The Uniformitarian-Catastrophist Debate', *Isis*, 51 (1960), 38-55.
- Cannon, Walter Faye. 'The Normative Role of Science in Early Victorian Thought', *Journal of the History of Ideas*, 25 (1964), 487-502.
- Cannon, Walter Faye. 'Scientists and Broad Churchmen: An Early Victorian Intellectual Network', *Journal of British Studies*, 4 (1964), 65-88.
- Cantor, Geoffrey. 'Henry Brougham and the Scottish Methodological Tradition', *Studies in History and Philosophy of Science*, 2 (1971), 69-89.
- Cantor, Geoffrey. *Michael Faraday: Sandemanian and Scientist. A Study of Science and Religion in the Nineteenth Century*. London: Macmillan, 1991.
- Capper, Charles and David A. Hollinger, eds. *The American Intellectual Tradition. A Sourcebook. Volume I: 1620-1865*. Oxford: Oxford University Press, 1989.
- Cappi, Alberto. 'Edgar Allan Poe's Physical Cosmology', *Quarterly Journal of the Royal Astronomical Society*, 35 (1994), 177-92.
- Cardwell, Donald S.L. *The Organisation of Science in England*. London: Heinemann, 1957, 1972.
- Carson, Cathryn and Silvan S. Schweber. 'Recent Biographical Studies in the Physical Sciences', *Isis*, 85 (1994), 284-92.
- Carwardine, Richard. *Transatlantic Revivalism: Popular Evangelicalism in Britain and America, 1790-1865*. Westport, Conn.: Greenwood Press, 1978.
- Chadwick, Owen. *The Victorian Church*. 2 vols. London: Black, 1966-70.
- Chadwick, Owen. *The Secularization of the European Mind in the Nineteenth Century*. Cambridge: Cambridge University Press, 1975.
- Chapple, John A.V. *Science and Literature in the Nineteenth Century*. London: Macmillan, 1986.

- Cherry, Conrad. 'Nature and the Republic: The New Haven Theology', *New England Quarterly*, 51 (1978), 509-26.
- Chitnis, Anand C. *The Scottish Enlightenment: A Social History*. London: Croom Helm, 1976.
- Christiansen, Rupert. *Romantic Affinities: Portraits from an Age 1780-1830*. New York: G.P. Putnam's Sons, 1988.
- Christie, John R.R. 'The Origins and Development of the Scottish Scientific Community, 1680-1760', *History of Science*, 12 (1974), 122-41.
- Christie, John R.R. 'The Rise and Fall of Scottish Science', in Maurice P. Crosland, ed., *The Emergence of Science in Western Europe*. London: Macmillan, 1975, pp. 111-26.
- Clark, John C.D. *English Society 1688-1832: Ideology, Social Structure and Political Practice during the Ancien Regime*. Cambridge: Cambridge University Press, 1985.
- Cleveland, Charles D. *English Literature of the Nineteenth Century*. Philadelphia: E.C. & J. Biddle, 1863.
- Clive, John. *Not by Fact Alone: Essays on the Writing and Reading of History*. New York: Alfred A. Knopf, 1989.
- Cole, Charles C. Jr. *The Social Ideas of the Northern Evangelists 1826-1860*. New York: Octagon Books, 1977.
- Connolly, Matthew Forster. *Biographical Dictionary of Eminent Men of Fife*. Cupar, Fife, 1866.
- Conser, Walter H., Jr. *God and the Natural World: Religion and Science in Antebellum America*. Columbia: University of South Carolina Press, 1993.
- Conway, Jill K. 'Politics, Pedagogy, and Gender', *Daedalus*, 116 (1987), 137-52.
- Cooter, Roger. 'Phrenology: The Provocation of Progress', *History of Science*, 14 (1976), 211-34.
- Cooter, Roger. *The Cultural Meaning of Popular Science: Phrenology and the Organization of Consent in Nineteenth Century Britain*. Cambridge: Cambridge University Press, 1984.
- Cooter, Roger and Stephen Pumfrey. 'Separate Spheres and Public Places: Reflections on the History of Science Popularization and Science in Popular Culture', *History of Science*, 32 (1994), 237-67.
- Corsi, Pietro. *Science and Religion: Baden Powell and the Anglican Debate, 1800-1860*. Cambridge: Cambridge University Press, 1988.
- Cosslett, Tess, ed. *Science and Religion in the Nineteenth Century*. Cambridge: Cambridge University Press, 1984.



Cott, Nancy F. *The Bonds of Womanhood: 'Woman's Sphere' in New England, 1780-1835*. New Haven: Yale University Press, 1977.

Coulson, C.A. *Science and Christian Belief*. London: Fontana, 1955, 1971.

Cronin, Vincent. *The View from Planet Earth: Man Looks at the Cosmos*. New York: Collins, 1982.

Crowe, Michael. *The Extraterrestrial Life Debate 1750-1900: The Idea of a Plurality of Worlds from Kant to Lowell*. Cambridge: Cambridge University Press, 1986.

Cruse, Amy. *The Victorians and their Reading*. Boston: Houghton Mifflin, 1935.

Cunningham, Andrew and Nicholas Jardine, eds. *Romanticism and the Sciences*. Cambridge: Cambridge University Press, 1990.

Cunningham, Andrew and Perry Williams, 'De-centring the "Big Picture": The Origins of Modern Science and the Modern Origins of Science', *British Journal for the History of Science*, 26 (1993), 407-32.

Cunningham, Hugh. *Leisure in the Industrial Revolution c.1780-c.1880*. London: Croom Helm, 1980.

Cunningham, Valentine. *Everywhere Spoken Against: Dissent in the Victorian Novel*. Oxford: Clarendon Press, 1975

Curry, Patrick. *A Confusion of Prophets: Victorian and Edwardian Astrology*. London: Collins & Brown, 1992.

Curti, Merle E. *The American Peace Crusade 1815-1860*. Durham, North Carolina: Duke University Press, 1929.

Curti, Merle E. *The Learned Blacksmith: The Letters and Journals of Elihu Burritt*. New York: Wilson-Erickson Inc., 1937.

Curti, Merle E. *The Growth of American Thought*. New York: Harper & Brothers, 1943.

Curtis, R.C. 'Baden Powell and the Whewell Legend', *Annals of Science*, 47 (1990), 301-12.

Dahm, John Johannes. 'Science and Apologetics in the Early Boyle Lectures', *Church History*, 39 (1970), 172-86.

Daniels, George H. 'An American Defense of Bacon: A Study of the Relations of Scientific Thought, 1840-1855', *Huntingdon Library Quarterly*, 28 (1965), 321-39.

Daniels, George H. 'The Process of Professionalization in American Science: The Emergent Period, 1820-1860', *Isis*, 58 (1967), 151-66.

Daniels, George H. *American Science in the Age of Jackson*. New York: Columbia University Press, 1968.

- Daniels, George H. *Science in American Society: A Social History*. New York: Alfred A. Knopf, 1971.
- Daniels, George H., ed. *Nineteenth-century American Science: A Reappraisal*. Evanston, Illinois: Northwestern University Press, 1972.
- Darnton, Robert. 'What is the History of Books?', *Daedalus*, 111 (1982), 65-83.
- Davidson, Cathy N. *Reading in America: Literature & Social History*. Baltimore: Johns Hopkins University Press, 1989.
- Davie, George Elder. *The Democratic Intellect: Scotland and her Universities in the Nineteenth Century*. Edinburgh: University Press, 1961.
- Dear, Peter. 'Totius in verba: Rhetoric and Authority in the early Royal Society', *Isis*, 76 (1985), 145-61.
- De Giustino, David. *Conquest of Mind: Phrenology and Victorian Social Thought*. London: Croom Helm, 1975.
- Delamont, Sara and Lorna Duffin, eds. *The Nineteenth-Century Woman: Her Cultural and Physical World*. London: Croom Helm, 1978.
- Desmond, Adrian. 'Artisan Resistance and Evolution in Britain, 1819-1848', *Osiris*, 2nd ser., 3 (1987), 77-110.
- Desmond, Adrian. *The Politics of Evolution: Morphology, Medicine, and Reform in Radical London*. Chicago: University of Chicago Press, 1989.
- Desmond, Adrian and James Moore. *Darwin*. London: Michael Joseph, 1991.
- Devine, Thomas Martin and Rosalind Mitchison, eds. *People and Society in Scotland: Volume 1, 1760-1830*. Edinburgh: John Donald, 1988.
- Dewhirst, David W. 'The Correspondence of the Rev. B.W.S. Vallack', *Quarterly Journal of the Royal Astronomical Society*, 23 (1982), 552-55.
- Dick, Steven J. *Plurality of Worlds: The Origins of the Extraterrestrial Life Debate from Democritus to Kant*. Cambridge: Cambridge University Press, 1982.
- Dictionary of American Biography*. 20 vols. New York: Charles Scribner's Sons, 1928-36.
- Dictionary of National Biography*. 21 vols. London: Oxford University Press, 1885-90.
- Dictionary of Scientific Biography*. 16 vols. New York: Charles Scribner, 1970-80.
- Dillenberger, John. *Protestant Thought and Natural Science: A Historical Interpretation*. London: Collins, 1961.
- Draper, John W. *History of the Conflict between Religion and Science*. New York, 1874.

- Drummond, Andrew L. and James Bulloch. *The Scottish Church 1688-1843: The Age of the Moderates*. Edinburgh: Saint Andrew Press, 1973.
- Drummond, Andrew L. and James Bulloch. *The Church in Victorian Scotland, 1843-1874*. Edinburgh: Saint Andrew Press, 1975.
- Dundee in 1793 and 1833: the First and Second Statistical Accounts. St. Andrews, Fife, 1991.
- The Eastern Highlands*. Ward and Lock's Historical and Pictorial Guide to Perth, Dundee, Aberdeen, and the Neighbourhood. London, 1882.
- Eisen, Sydney and Bernard V. Lightman. *Victorian Science and Religion: A Bibliography with Emphasis on Evolution, Belief and Unbelief, Comprised of Works Published from c.1900-1975*. Hamden, Conn.: Archon Books, 1984.
- Ekirch, Arthur A. Jr. *The Idea of Progress in America 1815-1860*. New York: Columbia University Press, 1944.
- Ellegård, Alvar. 'The Readership of the Periodical Press in Mid-Victorian Britain', *Göteborgs Universitets Arsskrift*, 63 (1957), 1-41.
- Ellegård, Alvar. *Darwin and the General Reader: The Reception of Darwin's Theory of Evolution in the British Periodical Press, 1859-1872*. Goteborg: Gothenburg Studies in English, 1958.
- Elliot, Clark A. 'Models of the American Scientist: A Look at Collective Biography', *Isis*, 73 (1982), 77-93.
- Encyclopaedia Britannica*. 9th Edition. 24 vols. Edinburgh, 1875-89.
- Evans, D. Gareth. *A History of Wales 1815-1906*. Cardiff: University of Wales Press, 1989.
- Evans, Joseph. *Biographical Dictionary of Ministers and Preachers of the Welsh Calvinistic Methodist Body or Presbyterians of Wales*. Carnarvon, 1907.
- Exman, Eugene. *The Brothers Harper: A Unique Publishing Partnership and its Impact on the Cultural Life of America from 1817 to 1853*. New York: Harper & Row, 1965.
- Farrar, W.V. 'Andrew Ure, F.R.S., and the Philosophy of Manufactures', *Notes and Records of the Royal Society*, 27 (1973), 299-324.
- Feather, John. *A History of British Publishing*. London: Routledge, 1988.
- Fielden, Kenneth. 'Samuel Smiles and Self-Help', *Victorian Studies*, 12 (1968), 155-76.
- Finke, R. and R. Stark, 'How the Upstart Sects won America: 1776-1850', *Journal for the Scientific Study of Religion*, 28 (1988), 27-44.
- Fisch, Harold. 'The Scientist as Priest: A Note on Robert Boyle's Natural Theology', *Isis*, 44 (1953), 252-65.

- Fisch, Menachem and Simon Schaffer, eds. *William Whewell: A Composite Portrait*. Oxford: Oxford University Press, 1991.
- Fladeland, Betty. *Men and Brothers: Anglo-American Antislavery Cooperation*. Urbana: University of Illinois Press, 1972.
- Fleming, Donald. *John William Draper and the Religion of Science*. Philadelphia: University of Pennsylvania Press, 1950.
- Foote, George A. 'The Place of Science in the British Reform Movement, 1830-1850', *Isis*, 42 (1951), 192-208.
- Foote, George A. 'Science and its Functions in Early Nineteenth Century England', *Osiris*, 11 (1954), 438-54.
- Ford, Harry. 'The Mills Observatory, Dundee', *Journal of the British Astronomical Association*, 93 (1983), 251-53.
- Fraser, W. Hamish. *Conflict and Class: Scottish Workers 1700-1838*. Edinburgh: John Donald Publishers Ltd, 1988.
- Gallagher, Catherine. *The Industrial Reformation of English Fiction: Social Discourse and Narrative Form 1832-1867*. Chicago: University of Chicago Press, 1985.
- Garner, A.D. and E.W. Jenkins. 'The English Mechanics' Institutes: The Case of Leeds, 1824-42', *History of Education*, 13 (1984), 139-52.
- Garnett, E. Jane. 'Bishop Butler and the Zeitgeist: Butler and the Development of Christian Moral Philosophy in Victorian Britain', in C. Cunliffe, ed., *Joseph Butler's Moral and Religious Thought: Tercentenary Essays*. Oxford: Clarendon Press, 1992, pp. 63-96.
- Gascoigne, John. 'From Bentley to the Victorians: The Rise and Fall of British Newtonian Natural Theology', *Science in Context*, 2 (1988), 219-56.
- Gascoigne, John. *Cambridge in the Age of Enlightenment: Science, Religion and Politics from the Restoration to the French Revolution*. Cambridge: Cambridge University Press, 1989.
- Gaskell, John Philip W. *A New Introduction to Bibliography*. Oxford: University Press, 1972.
- Gavine, David. 'The Mills Observatory, Dundee', *Journal of the British Astronomical Association*, 78 (1968), 278-81.
- Gavine, David. 'Thomas Dick, L.L.D., 1774-1857', *Journal of the British Astronomical Association*, 84 (1974), 345-50.
- Gavine, David. 'Navigation and Astronomy Teachers in Scotland Outside the Universities', *The Mariner's Mirror*, 76 (Feb. 1990), 5-12.
- Gavine, David. 'Thomas Dick (1774-1857) and the Plurality of Worlds', *Journal of the Astronomical Society of Edinburgh*, 28 (1992), 4-10.

- Genuth, Sara Schechner. 'From Heaven's Alarm to Public Appeal: Comets and the Rise of Astronomy at Harvard', in Clark A. Elliot and Margaret W. Rossiter, eds., *Science at Harvard University: Historical Perspectives*. Bethlehem, Penn.: Lehigh University Press, 1992, pp. 28-54.
- Gibbs, F.W. 'Itinerant Lecturers in Natural Philosophy', *Ambix*, 8 (1960), 111-17.
- Gillespie, Neal C. 'Preparing for Darwin: Conchology and Natural Theology in Anglo-American Natural History', *Studies in History of Biology*, 7 (1983), 93-145.
- Gillespie, Neal C. 'Divine Design and the Industrial Revolution: William Paley's Abortive Reform of Natural Theology', *Isis*, 81 (1990), 214-29.
- Gillespie, Neal C. 'Natural History, Natural Theology and Social Order: John Ray and the "Newtonian Ideology"', *Journal of the History of Biology*, 20 (1987), 1-49.
- Gillispie, Charles C. *Genesis and Geology: A Study in the Relations of Scientific Thought, Natural Theology, and Social Opinion in Great Britain, 1790-1850*. Cambridge: Harvard University Press, 1951.
- Gilmore, William J. *Reading becomes a Necessity of Life: Material and Cultural Life in Rural New England, 1780-1835*. Knoxville: University of Tennessee Press, 1989.
- Glick, Wendell. 'Bishop Paley in America', *The New England Quarterly*, 27 (1954), 347-54.
- Golby, John M. and A. William Purdue. *The Civilisation of the Crowd: Popular Culture in England 1750-1900*. London: Batsford Academic and Educational, 1984.
- Goldstein, Daniel. '"Yours for Science": The Smithsonian Institution's Correspondents and the Shape of Scientific Community in Nineteenth-century America', *Isis*, 85 (1994), 572-99.
- Golinski, Jan. *Science as Public Culture: Chemistry and Enlightenment in Britain*. Cambridge: Cambridge University Press, 1992.
- Gooday, Graeme. '"Nature" in the Laboratory: Domestication and Discipline with the Microscope in Victorian Life Science', *British Journal for the History of Science*, 24 (1991), 307-41.
- Green, Samuel Gosnell. *The Story of the Religious Tract Society for One Hundred Years*. London, 1899.
- Greenblatt, Stephen. *Renaissance Self-Fashioning*. Chicago: University of Chicago Press, 1980.
- Greene, John C. 'Some Aspects of American Astronomy, 1750-1815', *Isis*, 45 (1954), 339-58.
- Greene, John C. 'Protestantism, Science, and American Enterprise: Benjamin Silliman's Moral Universe', in Leonard G. Wilson, ed., *Benjamin Silliman and*

his Circle. New York: Science History Publications, 1979, pp. 11-27.

Greene, John C. *American Science in the Age of Jefferson*. Ames: Iowa State University Press, 1984.

Griest, Guinevere L. *Mudie's Circulating Library and the Victorian Novel*. Newton Abbot: David & Charles, 1970.

Gross, Robert A. 'Much Instruction from Little Reading: Books and Libraries in Thoreau's Concord' and 'Reconstructing Early American Libraries: Concord, Massachusetts, 1795-1850', *Proceedings of the American Antiquarian Society*, 97 (1987), 129-88; 331-451.

Gundry, D.W. 'The Bridgewater Treatises and their Authors', *History*, 31 (1946), 140-52.

Guralnick, Stanley M. *Science and the Ante-Bellum American College*. Philadelphia: American Philosophical Society, 1975.

Guralnick, Stanley M. 'Geology and Religion before Darwin: The Case of Edward Hitchcock, Theologian and Geologist (1793-1864)', *Isis*, 63 (1972), 529-43.

Halévy, Élie. *The Triumph of Reform 1830-1841*. Rev. ed. London: Ernest Benn Ltd, 1950, 1961.

Hall, David D. *Worlds of Wonder, Days of Judgment: Popular Religious Belief in early New England*. New York: Alfred A. Knopf, 1989.

Hall, Sophy. *Dr. Duncan of Ruthwell, Founder of Savings Banks*. Edinburgh, 1910.

Hankins, Thomas L. 'In Defence of Biography: The Use of Biography in the History of Science', *History of Science*, 17 (1979), 1-16.

Harper, J. Henry. *The House of Harper*. New York: Harper's, 1912.

Harrison, Brian. 'Religion and Recreation in Nineteenth-century England', *Past and Present*, 38 (1967), 98-125.

Harrison, J.F.C. *Learning and Living 1790-1960: A Study in the History of the English Adult Education Movement*. London: Routledge & Keegan Paul, 1961.

Harrison, J.F.C. *Early Victorian Britain, 1832-51*. London: Fontana, 1971, 1988.

Harrison, J.F.C. *The Second Coming: Popular Millenarianism 1780-1850*. London: Routledge & Kegan Paul, 1979.

Harrison, J.F.C. *The Common People: A History from the Norman Conquest to the Present*. London: Fontana, 1984.

Hart, Jenifer. 'Religion and Social Control in the Mid-Nineteenth Century', in A.P. Donajgrodzki, ed., *Social Control in Nineteenth Century Britain*. London: Croom Helm, 1977, pp. 108-37.

- Hays, J.N. 'Science and Brougham's Society', *Annals of Science*, 20 (1964), 227-41.
- Heeney, Brian. *A Different Kind of Gentleman: Parish Clergy as Professional Men in Early and mid-Victorian England*. Hamden, Conn.: Archon, 1976.
- Heffernan, William C. 'The Singularity of our Inhabited World: William Whewell and A.R. Wallace in Dissent', *Journal of the History of Ideas*, 39 (1978), 81-100.
- Heimann, Peter M., 'The Unseen Universe: Physics and the Philosophy of Nature in Victorian Britain', *British Journal for the History of Science*, 6 (1972), 73-9.
- Heimann, Peter M. 'Voluntarism and Immanence: Conceptions of Nature in Eighteenth-Century Thought', *Journal of the History of Ideas*, 39 (1978), 271-83.
- Herbert, William N. 'God's Astronomer: The Peculiar Universe of the Reverend Thomas Dick', in *Duende: A Dundee Anthology*. Dundee: Gairfish, 1991, pp. 49-61.
- Herbert, William N. *The Testament of the Reverend Thomas Dick*. Todmorden, Lancashire: Arc Publications, 1994.
- Hetherington, Norriss S. 'Cleveland Abbe and a View of Science in Mid-Nineteenth-Century America', *Annals of Science*, 33 (1976), 31-49.
- Hetherington, Norriss S. 'Mid-Nineteenth-Century American Astronomy: Science in a Developing Nation', *Annals of Science*, 40 (1983), 61-80.
- Hewitt, George Henry Gordon. *Let the People Read: A Short History of the United Society for Christian Literature*. London: United Society for Christian Literature, 1949.
- Heyck, Thomas W. *The Transformation of Intellectual Life in Victorian England*. London: Croom Helm, 1982.
- Hilgartner, Stephen. 'The Dominant View of Popularization: Conceptual Problems, Political Uses', *Social Studies of Science*, 20 (1990), 519-39.
- Hillway, Tyrus. 'Melville's Education in Science', *Texas Studies in Literature and Language*, 16 (1974), 411-25.
- Hilton, Boyd. 'Government and Politics 1783-1846: England, Scotland and Wales', in Christopher Haigh, ed., *The Cambridge Historical Encyclopedia of Great Britain and Ireland*. Cambridge: Cambridge University Press, 1985.
- Hilton, Boyd. *The Age of Atonement: The Influence of Evangelicalism on Social and Economic Thought, 1795-1865*. Oxford: Clarendon Press, 1988.
- Hodge, M.J.S. 'The Universal Gestation of Nature: Chambers' Vestiges and Explanations', *Journal of the History of Biology*, 5 (1972), 127-51.
- Hoffleit, Dorrit. *Astronomy at Yale 1701-1968*. New Haven, Conn.: Connecticut Academy of Art and Sciences, 1992.

- Holifield, E. Brooks. *The Gentleman Theologians: American Theology in Southern Culture, 1795-1860*. Durham, North Carolina: Duke University Press, 1978.
- Hook, Andrew. *Scotland and America: A Study of Cultural Relations 1750-1835*. Glasgow: Blackie and Son, 1975.
- Hopkins, Eric. *A Social History of the English Working Classes 1815-1945*. London: Edward Arnold, 1979.
- Hoskin, Michael. 'The Cosmology of Thomas Wright of Durham', *Journal for the History of Astronomy*, 1 (1970), 44-52.
- Houghton, Walter E. *The Victorian Frame of Mind 1830-1870*. New Haven: Yale University Press, 1957.
- Houghton, Walter E. 'Victorian Periodical Literature and the Articulate Classes', *Victorian Studies*, 22 (1979), 389-412.
- Hovenkamp, Herbert. *Science and Religion in America 1800-1860*. Philadelphia: University of Pennsylvania Press, 1978.
- Howe, Daniel Walker, ed. *Victorian America*. Philadelphia: University of Pennsylvania Press, 1976.
- Howe, Daniel Walker. *The Unitarian Conscience. Harvard Moral Philosophy, 1805-1861*. Middletown, Conn.: Wesleyan University Press, 1970, 1988.
- Howe, Daniel Walker. 'Religion and Politics in the Antebellum North', in Mark A. Noll, ed., *Religion and American Politics: From the Colonial Period to the 1980s*. Oxford: Oxford University Press, 1990, pp. 121-45.
- Hughes, Arthur. 'Science in English Encyclopedias, 1704-1875', *Annals of Science*, 7 (1951), 340-70; 8 (1952), 323-67.
- Hutcheson, E.G. 'Thomas Dick, LL.D., F.R.A.S., Astronomer and Reformer', *The People's Friend* [Dundee], (29 July 1901), 532.
- Inkster, Ian. 'Science and the Mechanics' Institutes, 1820-1850: The Case of Sheffield', *Annals of Science*, 32 (1975), 451-74.
- Inkster, Ian. 'The Social Context of an Educational Movement: A Revisionist Approach to the English Mechanics' Institutes, 1820-1850', *Oxford Review of Education*, 2 (1976), 277-307.
- Inkster, Ian. 'Robert Goodacre's Astronomy Lectures (1823-1825), and the Structure of Scientific Culture in Philadelphia', *Annals of Science*, 35 (1978), 353-63.
- Inkster, Ian. 'The Public Lecture as an Instrument of Science Education for Adults: The Case of Great Britain, c.1750-1850', *Paedagogica Historica*, 20 (1980), 80-107.
- Inkster, Ian. 'Advocates and Audience--Aspects of Popular Astronomy in England, 1750-1850', *Journal of the British Astronomical Association*, 92 (1982), 119-23.



Inkster, Ian and Jack B. Morrell, eds. *Metropolis and Province: Science in British Culture, 1780-1850*. London: Hutchinson, 1983.

Inkster, Ian, ed. *The Steam Intellect Society--Essays on Culture, Education and Industry circa 1820-1914*. University of Nottingham: Department of Adult Education, 1985.

Irving, Joseph. *The Book of Scotsmen Eminent for Achievements*. Paisley, 1881.

Isaac, Peter, ed. *Six Centuries of the Provincial Book Trade in Britain*. Winchester, 1990.

Jacyna, L.S. 'The Physiology of Mind, the Unity of Nature, and the Moral Order in Victorian Thought', *British Journal for the History of Science*, 14 (1981), 109-32.

Jacyna, L.S. 'Immanence or Transcendence: Theories of Life and Organization in Britain, 1790-1835', *Isis*, 74 (1983), 311-29.

James, Mary A. *Elites in Conflict: The Antebellum Clash over the Dudley Observatory*. New Brunswick: Rutgers University Press, 1987.

Jay, Elizabeth. *The Religion of the Heart: Anglican Evangelicalism and the Nineteenth-century Novel*. Oxford, 1979.

Jenkins, R.T., ed. *The Dictionary of Welsh Biography down to 1940*. London, 1959.

Johns, Adrian. 'History, Science, and the History of the Book: The Making of Natural Philosophy in Early Modern England', *Publishing History*, 30 (1991), 5-30.

Johnson, Clifton. *Old-time Schools and School-Books*. New York: Peter Smith, 1935.

Johnson, Richard. 'Educational Policy and Social Control in Early Victorian England', *Past and Present*, 49 (1970), 96-119.

Johnson, Richard. '"Really Useful Knowledge": Radical Education and Working-class culture, 1790-1848', in John Clarke, Chas Critcher, and Richard Johnson, eds., *Working-class Culture: Studies in History and Theory*. London: Hutchinson, 1979, pp. 75-102.

Jones, Bessie Z. and Lyle G. Boyd. *The Harvard College Observatory: The First Four Directorships, 1839-1919*. Cambridge: Harvard University Press, 1971.

Jones, David J.V. *The Last Rising: The Newport Insurrection of 1839*. Oxford: Clarendon Press, 1985.

Jones, Ieuan Gwynedd. *Explorations and Explanations: Essays in the Social History of Victorian Wales*. Llandysul: Gomer, 1981.

Jones, Peter, ed. *Philosophy and Science in the Scottish Enlightenment*. Edinburgh: John Donald Publishers Ltd., 1988.

- Jordanova, Ludmilla, ed. *Languages of Nature: Critical Essays on Science and Literature*. London: Free Association Books, 1986.
- Kargon, Robert H. *Science in Victorian Manchester: Enterprise and Expertise*. Baltimore: Johns Hopkins University Press, 1977.
- Kasson, John F. *Civilizing the Machine: Technology and Republican Values in America, 1776-1900*. New York: Penguin Books, 1976.
- Keir, David. *The House of Collins: The Story of a Scottish Family of Publishers from 1789 to the Present Day*. London: Collins, 1952.
- Kelley, Mary. *Private Women, Public Stage: Literary Domesticity in Nineteenth-Century America*. New York: Oxford University Press, 1984.
- Kelly, Thomas. *George Birkbeck: Pioneer of Adult Education*. Liverpool: Liverpool University Press, 1957.
- Kelly, Thomas. *Early Public Libraries: A History of Public Libraries in Great Britain before 1850*. London: The Library Association, 1966.
- Kerber, Linda K. *Women of the Republic: Intellect and Ideology in Revolutionary America*. Chapel Hill: University of North Carolina Press, 1980.
- Kidwell, Peggy Aldrich. 'Women Astronomers in Britain, 1780-1930', *Isis*, 75 (1984), 534-46.
- Kirby, R.G. 'An Early Experiment in Workers' Self-Education: The Manchester New Mechanics' Institute 1829-1835', in D.S.L. Cardwell, ed., *Artisan to Graduate*. Manchester: 1974, pp. 87-98.
- Klancher, Jon P. *The Making of English Reading Audiences, 1790-1832*. Madison, Wisconsin: University of Wisconsin Press, 1987.
- Knight, David M. *The Age of Science: The Scientific World-view in the Nineteenth Century*. Oxford: Basil Blackwell, 1986.
- Knoepfmacher, Ulrich Camillus and Georg Bernhard Tennyson, eds. *Nature and the Victorian Imagination*. Berkeley: University of California Press, 1977.
- Kohlstedt, Sally Gregory. 'In from the Periphery: American Women in Science, 1830-1880', *Signs: Journal of Women in Culture and Society*, 4 (1978), 81-96.
- Kohlstedt, Sally Gregory. 'Maria Mitchell and the Advancement of Women in Science', in Dorinda Outram and Pnina G. Abir-Am, eds., *Uneasy Careers and Intimate Lives: Women in Science, 1789-1979*. New Brunswick, New Jersey: Rutgers University Press, 1987, pp. 129-46.
- Kohlstedt, Sally Gregory. 'Curiosities and Cabinets: Natural History Museums and Education on the Antebellum Campus', *Isis*, 79 (1988), 405-26.
- Kohlstedt, Sally Gregory. 'Parlors, Primers, and Public Schooling: Education for Science in Nineteenth-Century America', *Isis*, 81 (1990), 425-45.
- Kuritz, Hyman. 'The Popularization of Science in Nineteenth-century America', *History of Education Quarterly*, 21 (1981), 259-74.

- Laqueur, Thomas Walter. *Religion and Respectability: Sunday Schools and Working Class Culture 1780-1850*. New Haven: Yale University Press, 1976.
- Lambert, W.R. *Drink and Sobriety in Victorian Wales c.1820-c.1895*. Cardiff: University of Wales Press, 1984.
- Lambert, W.R. 'Some Working-Class Attitudes towards Organized Religion in Nineteenth-Century Wales', in Gerald Parsons, ed., *Religion in Victorian Britain: Volume IV, Interpretations*. Manchester: Manchester University Press, 1988, pp. 96-114.
- Lawrence, Philip J. 'Edward Hitchcock: The Christian Geologist', *Proceedures of the American Philosophical Society*, 116 (1972), 21-34.
- Le Mahieu, D.L. *The Mind of William Paley: A Philosopher and his Age*. Lincoln: University of Nebraska Press, 1976.
- Leitch, William. 'Thomas Dick', in J.F. Waller, ed., *The Imperial Dictionary of Universal Biography*, 16 vols., London, 1857-63, v. 2, 92-3.
- Lenman, Bruce. *Integration, Enlightenment, and Industrialization: Scotland 1746-1832*. London: Edward Arnold, 1981.
- Lightman, Bernard. *The Origins of Agnosticism: Victorian Unbelief and the Limits of Knowledge*. Baltimore: Johns Hopkins University Press, 1987.
- Lindberg, David C. and Ronald L. Numbers, eds. *God & Nature: Historical Essays on the Encounter between Christianity and Science*. Berkeley: University of California Press, 1986.
- Lindberg, David C. and Ronald L. Numbers. 'Beyond War and Peace: A Reappraisal of the Encounter Between Christianity and Science', *Church History*, 55 (1986), 338-54.
- Lindberg, David C. et al. 'Review Symposia: Science and Religion', *Metascience*, 1 (1992), 31-52.
- Lindee, M. Susan. 'The American Career of Jane Marcet's *Conversations on Chemistry*, 1806-1853', *Isis*, 82 (1991), 8-23.
- Logue, Kenneth J. *Popular Disturbances in Scotland, 1780-1815*. Edinburgh: John Donald Publishers Ltd, 1979.
- Loomis, Elias. *Recent Progress of Astronomy; Especially in the United States*. New York, 1851, 1856.
- Lovejoy, Arthur O. *The Great Chain of Being: A Study of the History of an Idea*. Cambridge, Mass.: Harvard University Press, 1936.
- Lowson, Alexander. *Portrait Gallery of Forfar Notables*. Aberdeen, 1893.
- Luther, Paul. *Bibliography of Astronomers: Books and Pamphlets in English by and about Astronomers. Volume I: The Spirit of the Nineteenth Century*. Bernardston, Mass.: Astronomy Books, 1989.
- Lynch, Michael. *Scotland: A New History*. London: Pimlico, 1992.

- McCormmach, Russell. 'Ormsby MacKnight Mitchel's Sidereal Messenger, 1846-1848', *Proceedings of the American Philosophical Society*, 110 (1966), 35-47.
- McGuire, J.E. 'Boyle's Conception of Nature', *Journal of the History of Ideas*, 33 (1972), 523-42.
- McGuire, J.E. 'Newton on Place, Time, and God: An Unpublished Source', *British Journal for the History of Science*, 11 (1978), 114-29.
- Mackenzie, Rob. *David Livingstone: The Truth behind the Legend*. Eastbourne: Kingsway, 1993.
- McKerrow, John. *History of the Secession Church*. Rev. ed. Glasgow, 1841.
- MacLeod, Anne Scott. *A Moral Tale: Children's Fiction and American Culture 1820-1860*. Hamden, Conn.: Archon Books, 1975.
- MacLeod, Anne Scott. 'Children's Literature and American Culture 1820-1860', in James H. Fraser, ed., *Society & Children's Literature*. Boston: David R. Godine, 1978, pp. 11-31.
- MacLeod, Robert Duncan. *The Scottish Publishing Houses*. Glasgow, 1953.
- McLoughlin, William G. *Revivals, Awakenings and Reform: An Essay on Religion and Social Change in America, 1607-1977*. Chicago: University of Chicago Press, 1978.
- Macpherson, Hector. 'Thomas Dick: "The Christian Philosopher"', *Records of the Scottish Church History Society*, 11 (1955), 41-62.
- Mandelbrote, Scott. 'Essay Review: The Relationships of Science and Religion', *Annals of Science*, 50 (1993), 373-81.
- Marchand, Leslie A. *The Athenaeum: A Mirror of Victorian Culture*. Chapel Hill: University of North Carolina Press, 1941.
- Markley, Robert. *Fallen Languages: Crises of Representation in Newtonian England, 1660-1740*. Ithaca, New York: Cornell University Press, 1993.
- Marsden, George M. 'Everyone One's own Interpreter? The Bible, Science, and Authority in mid-Nineteenth-Century America', in Nathan O. Hatch and Mark A. Noll, eds., *The Bible in America: Essays in Cultural History*. New York: Oxford University Press, 1982, pp. 79-100.
- Marsden, George M. 'The Collapse of American Evangelical Academia', in Alvin Plantinga and Nicholas Wolterstorff, eds., *Faith and Rationality: Reason and Belief in God*. Notre Dame: Notre Dame University Press, 1983, pp. 219-64.
- Marsden, George M. 'Evangelicals and the Scientific Culture: An Overview', in Michael J. Lacey, ed., *Religion and Twentieth-century American Intellectual Life*. Cambridge: Cambridge University Press, 1989, pp. 23-48.
- Martin, Roger H. *Evangelicals United: Ecumenical Stirrings in Pre-Victorian Britain, 1795-1830*. London: Scarecrow Press, 1983.
- Martin, Theodora Penny. *The Sound of our own Voices: Women's Study Clubs*

- 1860-1910. Boston: Beacon Press, 1987.
- Medawar, Peter B. *The Limits of Science*. New York: Harper & Row, 1984.
- Meikle, Henry W. *Scotland and the French Revolution*. Glasgow, 1912.
- Merrill, Lynn L. *The Romance of Victorian Natural History*. Oxford: Oxford University Press, 1989.
- Merz, John T. *A History of European Thought in the Nineteenth Century*. 4 vols. Edinburgh: Blackwoods, 1894-1914.
- Meyer, Gerald Dennis. *The Scientific Lady in England 1650-1760: An Account of her Rise, with Emphasis on the Major Roles of the Telescope and Microscope*. Berkeley: University of California Press, 1955.
- Miles, Howard. 'William Andrews, a 19th Century Amateur Astronomer', *Journal of the British Astronomical Association*, 98 (1988), 245-48.
- Milham, Willis I. *Early American Observatories*. Williamstown, Mass., 1938.
- Millar, Alexander Hastie. *Haunted Dundee*. Dundee, 1923.
- Millburn, John R. *Benjamin Martin: Author, Instrument-Maker, and 'Country Showman'*. Leyden: Noordhoff International Publishing, 1976.
- Millburn, John R. and H.C. King. *Wheelwright of the Heavens: The Life & Work of James Ferguson, FRS*. London: Vade-Mecum Press Ltd, 1988.
- Miller, Howard S. *Dollars for Research: Science and its Patrons in Nineteenth-century America*. Seattle: University of Washington Press, 1970.
- Miller, Perry. *The Life of the Mind in America from the Revolution to the Civil War*. New York: Harcourt, Brace and World, Inc., 1965.
- Millhauser, Milton. 'The Scriptural Geologists: An Episode in the History of Opinion', *Osiris*, 11 (1954), 65-86.
- Millhauser, Milton. *Just Before Darwin: Robert Chambers and Vestiges*. Middletown, Conn.: Wesleyan University Press, 1959.
- Milne, J. 'Mudie's: The Diamond Jubilee of a Great Library', *The Strand Magazine*, 58 (1919), 138-42.
- Money, John. 'From Leviathan's Air Pump to Britannia's Voltaic Pile: Science, Public Life and the Forging of Britain, 1660-1820', *Canadian Journal of History*, 28 (1993), 521-44.
- Moore, James R. 'Crisis without Revolution: The Ideological Watershed in Victorian England', *Revue de Synthèse*, 4 (1986), 53-78.
- Moore, James R., ed. *History, Humanity, and Evolution: Essays for John C. Greene*. New York: Cambridge University Press, 1989.
- Moore, James R. 'Speaking of "Science and Religion"--Then and Now', *History of Science*, 30 (1992), 311-23.

- Moore, Robert. *Pit-men, Preachers and Politics: the Effects of Methodism in a Durham Mining Community*. Cambridge: Cambridge University Press, 1974.
- Morrell, Jack B. 'Individualism and the Structure of British Science in 1830', *Historical Studies in the Physical Sciences*, 3 (1971), 183-204.
- Morrell, Jack B. 'Professors Robison and Playfair, and the *Theophobia Gallica*: Natural Philosophy, Religion and Politics in Edinburgh, 1789-1815', *Notes and Records of the Royal Society*, 26 (1971), 43-63.
- Morrell, Jack B. 'The University of Edinburgh in the Late Eighteenth Century: Its Scientific Eminence and Academic Structure', *Isis*, 62 (1971), 158-71.
- Morrell, Jack B. 'Science and Scottish University Reform: Edinburgh in 1826', *British Journal for the History of Science*, 6 (1972), 39-56.
- Morrell, Jack B. 'The Leslie Affair: Careers, Kirk and Politics in Edinburgh in 1805', *Scottish Historical Review*, 54 (1975), 63-82.
- Morrell, Jack B. and Arnold W. Thackray. *Gentlemen of Science: Early Years of the British Association for the Advancement of Science*. Oxford: Oxford University Press, 1981.
- Morrison-Low, Alison D. and John R.R. Christie, eds. *'Martyr of Science': Sir David Brewster 1781-1868*. Edinburgh: Royal Scottish Museum, 1984.
- Morton, Alan Q. 'Lectures on Natural Philosophy in London, 1750-1765: S.C.T. Demainbray (1710-1782) and the "Inattention" of his Countrymen', *British Journal for the History of Science*, 23 (1990), 411-34.
- Morton, Alan Q., ed. 'Science Lecturing in the Eighteenth Century: A Special Issue', *British Journal for the History of Science*, 28 (1995), 1-99.
- Morus, Iwan. 'Different Experimental Lives: Michael Faraday and William Sturgeon', *History of Science*, 30 (1992), 1-28.
- Mott, Frank Luther. *A History of American Magazines 1741-1850*. Cambridge: Harvard University Press, 1930, 1938.
- Murray, Gail S. 'Rational Thought and Republican Verities: Children's Literature, 1789-1820', *Journal of the Early Republic*, 8 (1988), 159-77.
- Murray, Norman. *The Scottish Hand Loom Weavers 1790-1850: A Social History*. Edinburgh: John Donald Publishers Ltd., 1978.
- Myers, Greg. 'Science for Women and Children: The Dialogue of Popular Science in the Nineteenth Century', in John Christie and Sally Shuttleworth, eds., *Nature Transfigured: Science and Literature, 1700-1900*. Manchester: Manchester University Press, 1989, pp. 171-200.
- National Union Catalogue of Printed Books Pre-1956. New York: 1966.
- Neuburg, Victor E. *Popular Education in Eighteenth Century England*. London: Woburn Press, 1971.

- Neuburg, Victor E. *Popular Literature: A History and Guide from the Beginning of Printing to the Year 1897*. Harmondsworth: Penguin, 1977.
- Nicolson, Marjorie Hope. *Mountain Gloom and Mountain Glory: The Development of the Aesthetics of the Infinite*. Ithaca, New York: Cornell University Press, 1959.
- Nicolson, Marjorie Hope. 'Virtuoso', in P.P. Wiener, ed., *Dictionary of the History of Ideas*. 4 vols. New York: Charles Scribner's Sons, 1973, IV, 486-90.
- Noll, Mark A., ed. *The Princeton Theology, 1812-1921: Scripture, Science, and Theological Method from Archibald Alexander to Benjamin Breckinbridge Warfield*. Grand Rapids, Michigan: Baker Book House, 1983.
- Noll, Mark A. *A History of Christianity in the United States and Canada*. London: Society for the Promotion of Christian Knowledge, 1992.
- Noll, Mark A. and David W. Bebbington and George A. Rawlyk, eds. *Evangelicalism: Comparative Studies of Popular Protestantism in North America, the British Isles, and Beyond, 1700-1900*. Oxford: Oxford University Press, 1994.
- Nord, David Paul. 'The Evangelical Origins of Mass Media in America, 1815-1835', *Journalism Monographs*, no. 88 (May 1984).
- Norrie, William. *Dundee Celebrities of the Nineteenth Century*. Dundee, 1873.
- North, John S. *The Waterloo Directory of Scottish Newspapers and Periodicals, 1800-1900*. 2 vols. Waterloo, Ontario: North Waterloo Academic Press, 1989.
- Novak, Barbara. *Nature and Culture: American Landscape and Painting 1825-1875*. New York: Oxford University Press, 1980.
- Numbers, Ronald L. *Creation by Natural Law: Laplace's Nebular Hypothesis in American Thought*. Seattle: University of Washington Press, 1977.
- Numbers, Ronald L. 'Science and Religion', *Osiris*, 1 (1985), 59-80.
- Nye, Russel Blaine. *Society and Culture in America, 1830-1860*. New York: Harper & Row, 1974.
- Oakley, Francis. 'Christian Theology and the Newtonian Science: The Rise of the Concept of the Laws of Nature', *Church History*, 30 (1961), 433-57.
- Obelkevich, James. *Religion and Rural Society: South Lindsey 1825-1875*. Oxford: Clarendon Press, 1976.
- Ogilvie, Marilyn B. 'Robert Chambers and the Nebular Hypothesis', *British Journal for the History of Science*, 8 (1975), 214-32.
- Oliver, W.H. *Prophets and Millennialists: The Uses of Biblical Prophecy in England from the 1790s to the 1840s*. Oxford: Oxford University Press, 1978.
- Orange, A.D. 'The British Association for the Advancement of Science: The Provincial Background', *Science Studies*, 1 (1971), 315-29.

Orange, A.D. 'The Idols of the Theatre: The British Association and its Early Critics', *Annals of Science*, 32 (1975), 277-94.

Ospovat, Dov. *The Development of Darwin's Theory: Natural History, Natural Theology, and Natural Selection, 1838-1859*. Cambridge: Cambridge University Press, 1981.

Outram, Dorinda. 'Scientific Biography and the Case of Georges Cuvier: With a Critical Bibliography', *History of Science*, 14 (1976), 101-37.

Outram, Dorinda. 'The Language of Natural Power: The Eloges of Georges Cuvier and the Public Language of Nineteenth-Century Science', *History of Science*, 16 (1978), 153-78.

Paradis, James and Thomas Postlewait, eds. *Victorian Science and Victorian Values: Literary Perspectives*. New Brunswick, New Jersey: Rutgers University Press, 1985.

Parssinen, T.M. 'Popular Science and Society: The Phrenology Movement in Early Victorian Britain', *Journal of Social History*, 8 (1974), 1-20.

Patterson, Elizabeth Chambers. *Mary Somerville and the Cultivation of Science, 1815-1840*. The Hague, 1983.

Paul, Erich Robert. *Science, Religion, and Mormon Cosmology*. Chicago: University of Illinois Press, 1992.

Perkin, Harold. *The Origins of Modern English Society 1780-1880*. London: Routledge & Kegan Paul, 1969.

Plant, Marjorie. *The English Book Trade: An Economic History of the Making and Sale of Books*. 3rd. ed. London, 1974.

Porter, Charlotte. *The Eagle's Nest: Natural History and American Ideas, 1812-1842*. Tuscaloosa, Alabama: University of Alabama Press, 1986.

Porter, Roy S. 'Gentlemen and Geology: The Emergence of a Scientific Career, 1660-1920', *Historical Journal*, 21 (1978), 809-36.

Porter, Roy S. 'Science, Provincial Culture and Public Opinion in Enlightenment England', *British Journal for Eighteenth-Century Studies*, 3 (1980), 20-46.

Raven, Charles E. *Science, Religion, and the Future: A Course of Eight Lectures*. Cambridge: Cambridge University Press, 1943.

Reingold, Nathan. 'Definitions and Speculations: The Professionalization of Science in America in the Nineteenth Century', in Alexandra Oleson and Sanborn C. Brown, eds., *The Pursuit of Knowledge in the Early American Republic*. Baltimore: Johns Hopkins University Press, 1976, pp. 33-69.

Rice, C. Duncan. *The Scots Abolitionists 1833-1861*. Baton Rouge: Louisiana State University Press, 1981.

Rice, Daniel F. 'Natural Theology and the Scottish Philosophy in the Thought of Thomas Chalmers', *Scottish Journal of Theology*, 24 (1971), 23-46.



- Rice, Edwin W. *The Sunday-school Movement (1780-1917) and the American Sunday-school Union (1817-1917)*. Philadelphia, 1917; repr. Arno Press, 1971.
- Richards, Joan L. 'God, Truth, and Mathematics in Nineteenth Century England', in Mary Jo Nye, et al., *The Invention of Physical Science: Intersections of Mathematics, Theology and Natural Philosophy since the Seventeenth Century*. Dordrecht: Reidel, 1992, pp. 51-78.
- Robson, John M. 'The Fiat and Finger of God: The Bridgewater Treatises', in Richard J. Helmstadter and Bernard Lightman, eds., *Victorian Faith in Crisis: Essays on Continuity and Change in Nineteenth-century Religious Belief*. London: Macmillan, 1990, pp. 71-125.
- Rollo, James Alexander. *Dundee Historical Fragments: chiefly ecclesiastical*. Dundee, 1911.
- Rosenberg, Charles E. 'Science and Social Values in Nineteenth-century America', in Arnold Thackray and Everett Mendelsohn, eds., *Science and Values: Patterns of Tradition and Change*. New York: Humanities Press, 1974.
- Rosenberg, Charles E. *No Other Gods: On Science and American Social Thought*. Baltimore: Johns Hopkins University Press, 1976.
- Rosman, Doreen M. *Evangelicals and Culture*. London: Croom Helm, 1984
- Ross, S. 'Scientist: The Story of a Word', *Annals of Science*, 18 (1962), 65-85.
- Rossiter, Margaret. *Women Scientists in America: Struggles and Strategies to 1940*. Baltimore: Johns Hopkins University Press, 1982.
- Rothenberg, Marc. 'History of Astronomy', in Sally Gregory Kohlstedt and Margaret Rossiter, eds., *Historical Writing on American Science: Perspectives and Prospects*. Baltimore: Johns Hopkins University Press, 1985, pp. 117-31.
- Rothenberg, Marc. 'Patronage of Harvard College Observatory, 1839-1851', *Journal for the History of Astronomy*, 21 (1990), 37-46.
- Rousseau, G.S. 'Science Books and their Readers in the Eighteenth Century', in Isabel Rivers, ed., *Books and their Readers in Eighteenth Century England*. Leicester: University Press, 1982, pp. 197-255.
- Rowe, Kenneth E., ed. *Methodist Union Catalog: Pre-1976 Imprints*. Metuchen, New Jersey: Scarecrow Press, 1978.
- Royle, Edward. 'Mechanics' Institutes and the Working Classes, 1840-1860', *Historical Journal*, 14 (1971), 305-21.
- Royle, Edward. *Radical Politics 1790-1900: Religion and Unbelief*. London: Longman, 1971.
- Royle, Edward. *Victorian Infidels: The Origins of the British Secularist Movement, 1791-1866*. Manchester: Manchester University Press, 1974.
- Royle, Edward and James Walvin. *English Radicals and Reformers, 1760-1848*. Brighton: Harvester Press, 1982.

Rupke, Nicolaas A. *The Great Chain of History: William Buckland and the English School of Geology (1814-1849)*. Oxford: Clarendon Press, 1983.

Rule, John. *The Labouring Classes in early Industrial England, 1750-1850*. London: Longman, 1985.

Ruse, Michael. 'The Relationship between Science and Religion in Britain, 1830-1870', *Church History*, 44 (1975), 505-22.

Russell, Colin A., ed. *Science and Religious Belief: A Selection of Recent Historical Studies*. Milton Keynes: Open University Press, 1973.

Russell, Colin A. *Science and Social Change 1700-1900*. London: Macmillan, 1983.

Safford, Truman Henry. *The Development of Astronomy in the United States. A Discourse read June 25, 1888 to commemorate the fiftieth anniversary of the dedication of the Hopkins Observatory of Williams College*. Williamstown, Mass., 1888.

Saunders, Laurance James. *Scottish Democracy 1815-1840: The Social and Intellectual Background*. Edinburgh: Oliver and Boyd, 1950.

Schaffer, Simon. 'Fire and Evolutionary Cosmology', *Journal for the History of Astronomy*, 9 (1978), 180-200.

Schaffer, Simon. 'Natural Philosophy and Public Spectacle in the Eighteenth Century', *History of Science*, 21 (1983), 1-43.

Schaffer, Simon. 'The Political Theology of Seventeenth-Century Natural Science', *Ideas and Production: A Journal in the History of Ideas*, 1 (1983), 2-14.

Schaffer, Simon. 'Occultism and Reason', in Alan John Holland, ed., *Philosophy, Its History and Historiography*. Dordrecht: D. Reidel, 1985, pp. 117-43.

Schaffer, Simon and Steven Shapin. *Leviathan and the Air Pump: Hobbes, Boyle and the Experimental Life*. Princeton: Princeton University Press, 1985.

Schaffer, Simon. 'Godly Men and Mechanical Philosophers: Souls and Spirits in Restoration Natural Philosophy', *Science in Context*, 1 (1987), 55-85.

Schaffer, Simon. 'The Nebular Hypothesis and the Science of Progress', in James Moore, ed., *History, Humanity, and Evolution: Essays for John Greene*. New York: Cambridge University Press, 1989, pp. 131-64.

Schaffer, Simon. 'The Consuming Flame: Electrical Showmen and Tory Mystics in the World of Goods', in John Brewer and Roy Porter, eds., *Consumption and the World of Goods*. London: Routledge, 1993, pp. 489-526.

Schweber, S.S. 'Scientists as Intellectuals: The Early Victorians', in James G. Paradis and Thomas Postlewait, eds., *Victorian Science and Victorian Values: Literary Perspectives*. New Brunswick, New Jersey: Rutgers University Press, 1985, pp. 1-37.

- Scholnick, Robert J., ed. *American Literature and Science*. Lexington, Kentucky: University Press, 1992.
- Schudson, Michael and Chandra Mukerji, eds. *Rethinking Popular Culture: Contemporary Perspectives in Cultural Studies*. Berkeley: University of California Press, 1991.
- Science in Nineteenth-century Children's Books: An Exhibition based on the *Encyclopaedia Britannica Historical Collection of Books for Children*. Chicago: University of Chicago Library, 1966.
- Scott, Donald M. 'The Popular Lecture and the Creation of a Public in Mid-Nineteenth-Century America', *Journal of American History*, 66 (1980), 791-809.
- Scott, Rosemary. 'Pious Verse in the mid-Victorian Market Place: Facts and Figures', *Publishing History*, 33 (1993), 37-58.
- Secord, Anne. 'Corresponding Interests: Artisans and Gentlemen in Nineteenth-century Natural History', *British Journal for the History of Science*, 27 (1994), 383-408.
- Secord, Anne. 'Science in the Pub: Artisan Botanists in early Nineteenth-Century Lancashire', *History of Science*, 32 (1994), 269-315.
- Secord, James A. 'Newton in the Nursery: Tom Telescope and the Philosophy of Tops and Balls, 1761-1838', *History of Science*, 23 (1985), 127-51.
- Secord, James A. 'Natural History in Depth', *Social Studies of Science*, 15 (1985), 181-200.
- Secord, James A. 'Behind the Veil: Robert Chambers and Vestiges', in James Moore, ed., *History, Humanity, and Evolution: Essays for John Greene*. New York: Cambridge University Press, 1989, pp. 165-94.
- Shapin, Stephen. 'The Pottery Philosophical Society, 1819-1835: An Examination of the Cultural Uses of Provincial Science', *Science Studies*, 2 (1972), 311-36.
- Shapin, Steven and Arnold Thackray. 'Prosopography as a Research Tool in History of Science: The British Scientific Community 1700-1900', *History of Science*, 12 (1974), 1-28.
- Shapin, Steven. 'The Audience for Science in Eighteenth Century Edinburgh', *History of Science*, 12 (1974), 95-121.
- Shapin, Steven. 'Phrenological Knowledge and the Social Structure of Early Nineteenth-Century Edinburgh', *Annals of Science*, 32 (1975), 219-43.
- Shapin, Steven and Barry Barnes. 'Head and Hand: Rhetorical Resources in British Pedagogical Writing, 1770-1850', *Oxford Review of Education*, 2 (1976), 231-54.
- Shapin, Steven and Barry Barnes. 'Science, Nature and Control: Interpreting Mechanics' Institutes', *Social Studies of Science*, 7 (1977), 31-74.
- Shapin, Steven. 'Social Uses of Science', in George S. Rousseau and Roy

Porter, eds., *The Ferment of Knowledge: Studies in the Historiography of Eighteenth-Century Science*. Cambridge: Cambridge University Press, 1980.

Shapin, Steven. 'History of Science and its Sociological Reconstructions', *History of Science*, 20 (1982), 157-211.

Shapin, Steven. '"A Scholar and a Gentleman": The Problematic Identity of the Scientific Practitioner in Early Modern England', *History of Science*, 29 (1991), 279-327.

Shapin, Steven. 'Essay Review: Personal Development and Intellectual Biography: The Case of Robert Boyle', *British Journal for the History of Science*, 26 (1993), 335-45.

Shapiro, Barbara. 'Early Modern Intellectual Life: Humanism, Religion and Science in Seventeenth Century England', *History of Science*, 29 (1991), 45-71.

Sheehan, William. 'E.E. Barnard and Mars: The Early Years', *Journal of the British Astronomical Association*, 103 (1993), 34-6.

Sheets-Pyenson, Susan. 'A Measure of Success: The Publication of Natural History Journals in Early Victorian Britain', *Publishing History*, 9 (1981), 21-36.

Sheets-Pyenson, Susan. 'War and Peace in Natural History Publishing: The Naturalist's Library 1833-1843', *Isis*, 72 (1981), 50-72.

Sheets-Pyenson, Susan. 'Popular Science Periodicals in Paris and London: The Emergence of a Low Scientific Culture, 1820-1875', *Annals of Science*, 42 (1985), 549-72.

Sheets-Pyenson, Susan. 'New Directions for Scientific Biography: The Case of Sir William Dawson', *History of Science*, 28 (1990), 399-410.

Shepperson, George. 'Writings in Scottish-American History: A Brief Survey', *William and Mary Quarterly*, 11 (1954), 161-78.

Shiach, Morag. *Discourse on Popular Culture: Class, Gender and History in Cultural Analysis, 1730 to the Present*. Oxford: Polity Press, 1989.

Shinn, Terry and Richard Whitley, eds. *Expository Science: Forms and Functions of Popularization*. Dordrecht: D. Reidel, 1985.

Shortland, Michael. 'Bonneted Mechanic and Narrative Hero: The Self-Modelling of Hugh Miller', in Shortland, ed., *Hugh Miller: New Essays on his Life and Work*. Oxford: Oxford University Press, 1995.

Simpson, H. *The Lives of Eminent Philadelphians, now deceased*. Philadelphia, 1859.

Small, Robert. *History of the Congregations of the United Presbyterian Church from 1733 to 1900*. 2 vols. Edinburgh, 1904.

Smallwood, William Martin and Mabel S.C. Smallwood. *Natural History and the American Mind*. New York: Columbia University Press, 1941.

- Smith, Crosbie. '"Mechanical Philosophy" and the Emergence of Physics in Britain: 1800-1850', *Annals of Science*, 33 (1976), 3-29.
- Smith, Crosbie. 'From Design to Dissolution: Thomas Chalmers' Debt to John Robison', *British Journal for the History of Science*, 12 (1979), 59-70.
- Smith, Donald C. *Passive Obedience and Prophetic Protest: Social Criticism in the Scottish Church 1830-1945*. New York: Peter Lang, 1987.
- Smith, H. *The Society for the Diffusion of Useful Knowledge 1826-1846*. Halifax, Nova Scotia, 1974.
- Smith, James V. *The Watt Institution, Dundee 1824-49*. Abertay Historical Society, Publication 19, University of Dundee, 1978.
- Smith, James V. 'Manners, Morals and Mentalities: Reflections on the Popular Enlightenment of Early Nineteenth Century Scotland', in Walter M. Humes and Hamish M. Paterson, eds., *Scottish Culture and Scottish Education 1800-1980*. Edinburgh: John Donald Publishers, 1983, pp. 25-54.
- Smith, James V. 'Reason, Revelation, and Reform: Thomas Dick of Methven and the "Improvement of Society by the Diffusion of Knowledge"', *History of Education*, 12 (1983), 255-70.
- Smith, Wilson. 'William Paley's Theological Utilitarianism in America', *William and Mary Quarterly*, 11 (1954), 402-24.
- Smith-Rosenberg, Carroll. *Disorderly Conduct: Visions of Gender in Victorian America*. Oxford: Oxford University Press, 1985.
- Smout, Thomas Christopher. *A History of the Scottish People 1560-1830*. London: Collins, 1969, 1985.
- Smout, Thomas Christopher. *A Century of the Scottish People 1830-1950*. London: Collins, 1986.
- Soloway, Richard Allen. *Prelates and People: Ecclesiastical and Social Thought in England, 1783-1852*. London: Routledge and Kegan Paul, 1969.
- Somervell, D.C. *English Thought in the Nineteenth Century*. London: Methuen, 1929.
- Squire Sprigge, S. *The Methods of Publishing*. London, 1890.
- Stambler, Leah G. 'The Lyceum Movement in American Education, 1826-1845', *Paedagogica Historica*, 21 (1981), 157-85.
- Stephens, Michael D. & Gordon W. Roderick. 'Science, the Working Classes and Mechanics' Institutes', *Annals of Science*, 29 (1972), 349-60.
- Stevenson, Louise L. *Scholarly Means to Evangelical Ends: The New Haven Scholars and the Transformation of Higher Learning in America, 1830-1890*. Baltimore: Johns Hopkins University Press, 1986.
- Stevenson, Louise L. 'Little Women? The Female Mind at Work in Antebellum America', *History Today*, 45 (Mar. 1995), 26-31.

- Stewart, Larry. *The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660-1750*. Cambridge: Cambridge University Press, 1992.
- Stewart, Larry and Paul Weindling. 'Philosophical Threads: Natural Philosophy and Public Experiment among the Weavers of Spitalfields', *British Journal for the History of Science*, 28 (1995), 37-62.
- Storch, Robert D. 'The Problem of Working Class Leisure. Some Roots of Middle-class Moral Reform in the Industrial North: 1825-1850', in A.P. Donajrodzki, ed., *Social Control in Nineteenth Century Britain*. London: Croom Helm, 1977, pp. 138-62.
- Sutton, Alan. *A Victorian World of Science: A Collection of Unusual Items and Anecdotes Connected with Ideas about Science and its Applications in Victorian Times*. Bristol: Adam Hilger Ltd., 1986.
- Sutton, Walter. *The Western Book Trade: Cincinnati as a Nineteenth-century Publishing and Book-trade Center*. Columbus: Ohio State University Press, 1961.
- Swindells, Julia. *Victorian Writing and Working Women: The Other Side of Silence*. Cambridge: Polity Press, 1985.
- Tebbel, John. *A History of Book Publishing in the United States. Volume I. The Creation of an Industry 1630-1865*. New York: R.R. Bowker, 1972.
- Thackray, Arnold. 'Natural Knowledge in Cultural Context: The Manchester Model', *American Historical Review*, 79 (1974), 672-709.
- Thomis, Malcolm I. and Peter Holt. *Threats of Revolution in Britain, 1789-1848*. London: Macmillan, 1977.
- Thompson, E.P. *The Making of the English Working Class*. London: Penguin Books, 1963, 1980.
- Thompson, F.M.L. *The Rise of Respectable Society: A Social History of Victorian Britain 1830-1900*. Cambridge, Mass., 1988.
- Thomson, Thomas, ed. *A Biographical Dictionary of Eminent Scotsmen*. 3 vols. Edinburgh, 1868-70.
- Tolis, Peter. *Elihu Burritt: Crusader for Brotherhood*. Hamden, Connecticut: Archon, 1968.
- Topham, Jonathan. 'Science and Popular Education in the 1830s: The Role of the Bridgewater Treatises', *British Journal for the History of Science*, 25 (1992), 397-430.
- Tulloch, John. *Movements of Religious Thought in Britain during the Nineteenth Century*. London: Longmans, Green and Co., 1885.
- Turner, Frank M. *Between Science and Religion: The Reaction to Scientific Naturalism in Late Victorian England*. New Haven: Yale University Press, 1974.

- Turner, Frank M. 'The Victorian Conflict between Science and Religion: A Professional Dimension', *Isis*, 69 (1978), 356-76.
- Turner, Frank M. *Contesting Cultural Authority: Essays in Victorian Intellectual Life*. Cambridge: Cambridge University Press, 1993.
- Turner, James. *Without God, Without Creed: The Origins of Unbelief in America*. Baltimore: Johns Hopkins University Press, 1985.
- Tylecote, Mabel. *The Mechanics' Institutes of Lancashire and Yorkshire before 1851*. Manchester: Manchester University Press, 1957.
- Ventre, John E. and Edward J. Goodman. *A Brief History of the Cincinnati Astronomical Society*. Cincinnati, 1985.
- Victorian Scotland. Broughty Ferry. *A Victorian Suburb. A Guided Walk*. 1978.
- Vincent, David. *Bread, Knowledge and Freedom: A Study of Nineteenth-century Working Class Autobiography*. London: Europa, 1981.
- Vincent, David. 'Reading in the Working-Class Home', in John K. Walton and James Walvin, eds., *Leisure in Britain 1780-1939*. Manchester: Manchester University Press, 1983, pp. 207-26.
- Vincent, David. *Literacy and Popular Culture: England 1750-1914*. Cambridge: Cambridge University Press, 1989.
- Wach, Howard M. 'Culture and the Middle Classes: Popular Knowledge in Industrial Manchester', *Journal of British Studies*, 27 (1988), 375-404.
- Wallace, Ryland. *"Organise! Organise! Organise!": A Study of Reform Agitations in Wales, 1840-1886*. Cardiff: University of Wales Press, 1991.
- Warden, Alexander Johnston. *Angus or Forfarshire, the Land and People, Descriptive and Historical*. 5 vols. Dundee, 1880-85.
- Warner, Deborah Jean. 'Science Education for Women in Antebellum America', *Isis*, 69 (1978), 58-67.
- Warner, Deborah Jean. 'Astronomy in Antebellum America', in Nathan Reingold, ed., *The Sciences in the American Context: New Perspectives*. Washington: Smithsonian, 1979, pp. 55-75.
- Warner, Deborah Jean. 'Women Astronomers', *Natural History*, 88 (1979), 12-26.
- Warner, Deborah Jean. 'Commodities for the Classroom: Apparatus for Science and Education in Antebellum America', *Annals of Science*, 45 (1988), 387-97.
- Warner, John Harley. '"Exploring the Inner Labyrinths of Creation": Popular Microscopy in Nineteenth-century America', *Journal of the History of Medicine and Allied Sciences*, 37 (1982), 7-33.
- Warner, Michael. 'Literary Studies and the History of the Book', *The Book: Newsletter of the Program in the History of the Book in American Culture*, 12 (July 1987), 3-9.

Waterman, Anthony Michael C. 'The Ideological Alliance of Political Economy and Christian Theology, 1798-1833', *Journal of Ecclesiastical History*, 34 (1983), 231-44.

Watkinson, James D. 'Useful Knowledge? Concepts, Values, and Access in American Education, 1776-1840', *History of Education Quarterly*, 30 (1990), 351-70.

Webb, Robert Kiefer. *The British Working Class Reader 1790-1848: Literary and Social Tension*. London: George Allen & Unwin Ltd., 1955.

Webster, Charles. *The Great Instauration: Science, Medicine and Reform 1626-1660*. London: Duckworth, 1975.

White, Andrew D. *A History of the Warfare of Science with Theology in Christendom*. New York: George Braziller, [1896], 1955.

Wiener, Martin J., ed. 'Humanitarianism or Control? A Symposium on Aspects of Nineteenth-century Social Reform in Britain and America', *Rice University Studies*, 67 (1981), 1-84.

Wilde, C.B. 'Matter and Spirit as Natural Symbols in Eighteenth-Century British Natural Philosophy', *British Journal for the History of Science*, 15 (1982), 99-131.

Wilks, Ivor G. Hughes. *South Wales and the Rising of 1839: Class Struggle as Armed Struggle*. London: Croom Helm, 1984.

Willey, Basil. *The Eighteenth-Century Background: Studies on the Idea of Nature in the Thought of the Period*. Harmondsworth: Penguin, 1940, 1972.

Wilson, Alexander. *The Chartist Movement in Scotland*. Manchester: Manchester University Press, 1970.

Wilson, David B. 'Victorian Science and Religion', *History of Science*, 15 (1977), 52-67.

Wilson, James. *Biography of the Blind*. 4th ed. Birmingham, 1838.

Wood, Paul B. 'Methodology and Apologetics: Thomas Sprat's History of the Royal Society', *British Journal for the History of Science*, 43 (1980), 1-26.

Wright, David Gordon. *Popular Radicalism: The Working-Class Experience, 1780-1880*. London: Longman, 1988.

Yeo, Richard R. 'William Whewell, Natural Theology and the Philosophy of Science in Mid Nineteenth Century Britain', *Annals of Science*, 36 (1979), 493-516.

Yeo, Richard R. 'Science and Intellectual Authority in Mid-Nineteenth-Century Britain: Robert Chambers and Vestiges of the Natural History of Creation', *Victorian Studies*, 28 (1984), 5-31.

Yeo, Richard R. 'An Idol of the Market-place: Baconianism in Nineteenth Century Britain', *History of Science*, 23 (1985), 251-98.



Yeo, Richard R. 'The Principle of Plenitude and Natural Theology in Nineteenth-Century Britain', *British Journal for the History of Science*, 19 (1986), 263-82.

Yeo, Richard R. *Defining Science: William Whewell, Natural Knowledge, and Public Debate in Early Victorian Britain*. Cambridge: Cambridge University Press, 1993.

Yeo, Richard R. 'Genius, Method, and Morality: Images of Newton in Britain, 1760-1860', *Science in Context*, 2 (1988), 257-84.

Yeo, Richard R. 'Author's Response' in 'Review Symposia: Public Science', *Metascience*, 5 (1994), 24-30.

Young, Davis A. 'Nineteenth Century Christian Geologists and the Doctrine of Scripture', *Christian Scholar's Review*, 11 (1982), 212-28.

Young, George Malcolm, ed. *Early Victorian England, 1830-65*. 3 vols. London: Oxford University Press, 1934.

Young, George Malcolm. *Victorian England: Portrait of an Age*. 2d ed. London, 1953.

Young, Robert M. *Darwin's Metaphor: Nature's Place in Victorian Culture*. Cambridge: Cambridge University Press, 1985.

Zochert, Donald, 'Science and the Common Man in Ante-bellum America', *Isis*, 1974, 65: 448-73.